UNIVERSITY RECORD

UNIVERSITY OF FLORIDA

GRADUATE CATALOG 1980-81

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Graduate School
223 Grinter Hall—(904)392-4646
University of Florida, Gainesville, Florida 32611

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135 Tigert Hall—(904)392-1365

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This publication has been adopted as a rule of the University pursuant to the provisions of Chapter 120 of the Florida Statute. Addenda to the University Record Series, if any, are available upon request to the Office of the Registrar.

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GRADUATE CATALOG

university record of the

UNIVERSITY OF FLORIDA

gainesville 1980/1981

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CRITICAL DATES FOR GRADUATE STUDENTS

DEADLINE DATES FOR GRADUATE STUDENTS

Fall Term 1980

University Dates
Admission Application ..... July 25
Classes Begin ..... September 22
Late Registration ..... September 19-26
Admission to Candidacy for Master's Degrees ..... August 22
Midpoint of Quarter ..... October 29
Classes End ..... December 5
Commencement ..... December 13

Thesis and Dissertation
First Submission of Dissertation ..... November 10
Submit Signed Original Thesis and Exam Form ..... November 21
Submit Signed Dissertation and Exam Form ..... December 8

GSFLT and GRE Test Dates
GRE Application ..... May 14, September *
GRE Examination ..... June 14, October *
GSFLT Examination ..... October 18

Winter Term 1981

University Dates
Admission Application ..... November 7
Classes Begin ..... January 7
Late Registration ..... January 7-13
Admission to Candidacy for Master's Degrees ..... December 5
Midpoint of Quarter ..... February 11
Classes End ..... March 13
Commencement ..... March 21

Thesis and Dissertation
First Submission of Dissertation ..... February 16
Submit Signed Original Thesis and Exam Form ..... February 27
Submit Signed Dissertation and Exam Form ..... March 16

GSFLT and GRE Test Dates
GRE Application ..... November *
GRE Examination ..... December *
GSFLT Examination ..... February 21

Spring Term 1981

University Dates
Admission Application ..... February 13
Classes Begin ..... March 30
Late Registration ..... March 30-April 3
Admission to Candidacy for Master's Degrees ..... March 13
Midpoint of Quarter ..... May 6
Classes End ..... June 5
Commencement ..... June 13

Thesis and Dissertation
First Submission of Dissertation ..... May 11
Submit Signed Original Thesis and Exam Form ..... May 22
Submit Signed Dissertation and Exam Form ..... June 8

GSFLT and GRE Test Dates
GRE Application ..... December *
GRE Examination ..... January *
GSFLT ..... April 18

Summer Term 1981

University Dates
Admission Application ..... May 1
Classes Begin ..... June 22
Late Registration ..... June 22-26
Admission to Candidacy for Master's Degrees ..... June 5
Midpoint of Quarter ..... July 23
Classes End ..... August 21
Commencement ..... August 29

Thesis and Dissertation
First Submission of Dissertation ..... July 27
Submit Signed Original Thesis and Exam Form ..... August 7
Submit Signed Dissertation and Exam Form ..... August 24

GSFLT and GRE Test Dates
GRE Application ..... January *, March *
GRE Examination ..... February *, April *
GSFLT Examination ..... June 20

*GRE dates were not available at printing time These dates will be available in the Graduate School beginning Summer Term 1980.

UNIVERSITY OF FLORIDA CALENDAR*

FALL QUARTER

1980

July 3, Thursday, 4:00 p.m.
Last day for currently enrolled students to file application at Registrar's Office for admission to Graduate School.

July 25, Friday, 4:00 p.m.
Last day for those not previously in attendance at the University of Florida to file application for admission for Fall Quarter, and for those previously in attendance to apply for registration appointments.

August 22, Friday, 4:00 p.m.
Last day to file application for **Admission to Candidacy** for master's degree to be conferred at end of Fall Quarter.

August 29, Friday, 4:00 p.m.
Last day for those whose applications were filed by above deadline to clear admissions. All credentials must have been received and college changes approved. Those who clear after this date will be assigned late registration appointments.

September 15-18, Monday-Thursday
Registration (including payment of fees) according to assigned appointments. No one permitted to start regular registration after 3:00 p.m., Thursday, September 18.

September 19-26, Friday-Friday
Late registration. Students subject to late registration fee.

September 22, Monday
Classes begin.

September 26, Friday, 4:00 p.m.
Last day for DROP/ADD and for changing sections.

September 29, Monday, 2:30 p.m.
Last day to pay fees without being subject to late fee.

October 3, Friday, 4:00 p.m.
Last day to apply at Registrar's Office for degree to be conferred at end of Fall Quarter.

October 10, Friday, 4:00 p.m.
Last day to file application with Registrar's Office to change college or major department for Winter Quarter.

*This Calendar may be subject to change Should subsequent notices be in conflict with the dates listed herein, the latest information should be followed. *Deadline Dates* are available each quarter from the Graduate School Office.

October 18, Saturday, 9:00 a.m.
Foreign language reading knowledge examination (GSFLT) in French, German, and Spanish.

October 29, Wednesday
Midpoint of term for completing doctoral qualifying examination.

October 31-November 1, Friday-Saturday
Homecoming. All classes suspended Friday.

November 7, Friday, 4:00 p.m
Last day for currently enrolled students to file application at Registrar's Office for admission to Graduate School.

November 10, Monday, 4:00 p.m.
Last day for candidates for doctoral degrees to file dissertations, fee receipts for library hardbinding and microfilming, and all doctoral forms with the Graduate School.

November 11, Tuesday, Veterans Day
Classes suspended.

November 21, Friday, 4:00 p.m.
Last day to withdraw without receiving failing grades in all courses.
Last day to submit signed original copies of master's theses, Final Examination Reports, abstracts, and binding fee receipts to 274 GRI.

November 27-29, Thursday-Saturday
Thanksgiving — Classes suspended 10:00 p.m., November 26.

December 5, Friday
All classes end.

December 8, Monday
Last day to submit signed original copies of dissertations and Final Examination Reports to 274 GRI.
Final Examination Reports for nonthesis degrees due in 288 GRI
Final examinations begin.

December 11, Thursday, 10:00 a.m.
Grades for degree candidates due in Registrar's Office.

December 12, Friday, 10:00 a.m.
Report of colleges on candidates for degrees due in Graduate School Office.

December 13, Saturday
Commencement Convocation.

December 15, Monday, 9:00 a.m.
All grades for Fall Quarter due in Registrar's Office.

WINTER QUARTER

1980

November 7, Friday, 4:00 p.m.
Last day for those not previously in attendance at the University of Florida to file application for admission for Winter Quarter, and for those previously in attendance to apply for registration appointments.

December 5, Friday, 4:00 p.m.
Last day to file application for **Admission to Candidacy** for master's degree to be conferred at end of Winter Quarter.
Last day for those whose applications were filed by above deadline to clear admissions. All credentials must have been received and college changes approved. Those who clear after this date will be assigned late registration appointments.

1981

January 5-6, Monday-Tuesday
Registration (including payment of fees) according to assigned appointments. No one permitted to start regular registration after 3:00 p.m., Tuesday, January 6

January 7, Wednesday
Classes begin.

January 7-13, Wednesday-Tuesday
Late registration. Students subject to late registration fee.

January 13, Tuesday, 4:00 p.m.
Last day for DROP/ADD and for changing sections.

January 14, Wednesday, 2:30 p.m.
Last day to pay fees without being subject to late fee.

January 20, Tuesday, 4:00 p.m.
Last day to apply at Registrar's Office for degree to be conferred at end of Winter Quarter.
Last day to file application with Registrar's Office to change college or major department for Spring Quarter.

February 11, Wednesday
Midpoint of term for completing doctoral qualifying examination.

February 13, Friday, 4:00 p.m.
Last day for currently enrolled students to file application at Registrar's Office for admission to Graduate School.

February 16, Monday, 4:00 p.m.
Last day for candidates for doctoral degrees to file dissertations, fee receipts for library hardbinding and microfilming, and all doctoral forms with the Graduate School.

February 21, Saturday, 9:00 a.m.
Foreign language reading knowledge examination (GSFLT) in French, German, and Spanish.

February 27, Friday, 4:00 p.m.
Last day to withdraw without receiving failing grades in all courses.
Last day to submit signed original copies of master's theses, Final Examination Reports, abstracts, and binding fee receipts to 274 GRI.

March 13, Friday
All classes end.

March 16, Monday
Last day to submit signed original copies of dissertations and Final Examination Reports to 274 GRI.
Final Examination Reports for nonthesis degrees due in 288 GRI.
Final examinations begin.

March 19, Thursday, 10:00 a.m.
Grades for degree candidates due in Registrar's Office.

March 20, Friday, 10:00 a.m.
Report of colleges on candidates for degrees due in Graduate School Office.

March 21, Saturday
Commencement Convocation.

March 23, Monday, 9:00 a.m.
All grades for Winter Quarter due in Registrar's Office.

SPRING QUARTER

1981

February 13, Friday, 4:00 p.m.
Last day for those not previously in attendance at the University of Florida to file application for admission for Spring Quarter, and for those previously in attendance to apply for registration appointments.

March 13, Friday, 4:00 p.m
Last day for those whose applications were filed by the above deadline to clear admissions. All credentials must have been received and college changes approved. Those who clear after this date will be assigned late registration appointments.
Last day to file application for **Admission to Candidacy** for master's degree to be conferred at end of Spring Quarter.

March 27, Friday
Registration (including payment of fees) according to assigned appointments. No one permitted to start regular registration after 3:00 p.m.

March 30, Monday
Classes begin.

March 30-April 3, Monday-Friday
Late registration. Students subject to late registration fee.

April 3, Friday, 4:00 p.m.
Last Day for DROP/ADD and for changing sections.

April 6, Monday, 2:30 p.m.
Last day to pay fees without being subject to late fee.

April 10, Friday, 4:00 p.m.
Last day to apply at Registrar's Office for degree to be conferred at end of Spring Quarter.

April 17, Friday, 4:00 p.m.
Last day to file application with Registrar's Office to change college or major department for the Summer Quarter.

April 18, Saturday, 9:00 a.m.
Foreign language reading knowledge examination (GSFLT) in French, German, and Spanish.

May 1, Friday, 4:00 p.m.
Last day for currently enrolled students to file application at Registrar's Office for admission to Graduate School.

May 6, Wednesday
Midpoint of term for completing doctoral qualifying examinations.

May 11, Monday, 4:00 p.m.
Last day for candidates for doctoral degrees to file dissertations, fee receipts for library hardbinding and microfilming, and all doctoral forms with the Graduate School.

May 22, Friday, 4:00 p.m.
Last day to withdraw without receiving failing grades in all courses.
Last day to submit signed original copies of master's theses, Final Examination Reports, abstracts, and binding fee receipts to 274 GRI.

May 25, Monday, Memorial Day
Classes suspended.

June 5, Friday
All classes end.

June 8, Monday
Last day to submit original signed copies of dissertations and Final Examination Reports to 274 GRI.

June 8, Monday
Final Examination Reports for nonthesis degrees due in 288 GRI.
Final examinations begin.

June 11, Thursday, 10:00 a.m.
Grades for degree candidates due in Registrar's Office.

June 12, Friday, 10:00 a.m.
Report of colleges on candidates for degrees due in Graduate School Office.

June 13, Saturday
Commencement Convocation.

June 15, Monday, 9:00 a.m.
All grades for Spring Quarter due in Registrar's Office.

SUMMER QUARTER

1981

May 1, Friday, 4:00 p.m.
Last day for those not previously in attendance at the University of Florida to file application for admission for Summer Quarter, and for those previously in attendance to apply for registration appointments.

NOTE: The Graduate Record Examination is given six times each academic year in October, December, January, February, April, and June. The deadline for applications is approximately four weeks prior to the examination date. Exact dates will be available from Educational Testing Service, Princeton, New Jersey 08541, or from the Graduate School during Summer Quarter 1980

June 5, Friday, 4:00 p.m.
Last day to file application for **Admission to Candidacy** for a master's degree to be conferred at end of Summer Quarter.
Last day for those whose applications were filed by the above deadline to clear admissions. All credentials must have been received and college changes approved. Those who clear after this date will be assigned late registration appointments.

June 18-19, Thursday-Friday
Registration (including payment of fees) according to assigned appointments. No one permitted to start regular registration after 3:00 p.m., Friday, June 19.

June 20, Saturday, 9:00 a.m.
Foreign language reading knowledge examinations (GSFLT) in French, German and Spanish.

June 22, Monday
Classes begin.

June 22-26, Monday-Friday
Late registration. Students subject to late registration fee.

June 26, Friday, 4:00 p.m.
Last day for DROP/ADD and for changing sections.

June 29, Monday, 2:30 p.m.
Last day to pay fees without being subject to late fee.

July 2, Thursday, 4:00 p.m.
Last day to apply at Registrar's Office for degree to be conferred at end of Summer Quarter.

July 3, Friday, Independence Day
Classes suspended.

July 10, Friday, 4:00 p.m.
Last day to file application with Registrar's Office to change college or major department for the Fall Quarter.

July 23, Thursday
Midpoint of term for completing doctoral qualifying examinations.

July 24, Friday
Last day of Special Five-Week Summer course offerings.

July 27, Monday, 4:00 p.m.
Last day for candidates for doctoral degrees to file dissertations, fee receipts for library hardbinding and microfilming, and all doctoral forms with the Graduate School.

August 3, Monday, 9:00 a.m.
All grades for Special Five-Week Summer course offerings due in Registrar's Office.

August 7, Friday, 4:00 p.m.
Last day to withdraw without receiving failing grades in all courses.
Last day to submit signed original copies of master's theses, Final Examination Reports, abstracts, and binding fee receipts to 274 GRI.

August 21, Friday
All classes end.

August 24, Monday
Last day to submit signed original copies of dissertations and Final Examination Reports to 274 GRI
Final Examination Reports for nonthesis degrees due in 288 GRI.
Final examinations begin.

August 27, Thursday, 10:00 a.m.
Grades for degree candidates due in Registrar's Office.

August 28, Friday, 10:00 a.m.
Report of colleges on candidates for degrees due in Graduate School Office.

August 29, Saturday
Commencement Convocation.

August 31, Monday, 9:00 a.m.
All grades for Summer Quarter due in Registrar's Office.

General Information

Rules, policies, fees, and courses described in this *Catalog* are subject to change without notice.

THE GRADUATE SCHOOL

ORGANIZATION AND HISTORY

The Graduate School consists of the dean, associate dean, assistant deans, the Graduate Council, and the graduate faculty. General policies and standards of the Graduate School are established by the graduate faculty. Any policy change must be approved by the graduate deans and the Graduate Council. The Graduate School is responsible for the enforcement of minimum general standards of graduate work in the University and for the coordination of the graduate programs of the various colleges and divisions of the University. The responsibility for the detailed operations of graduate programs is vested in the individual colleges, divisions, and departments. In most of the colleges an assistant dean or other official is directly responsible for graduate study in his college.

The Graduate Council, of which the graduate dean is chairman, assists him in being the agent of the graduate faculty for execution of policy related to graduate study and associated research. The Council considers petitions and recommends the award of graduate degrees. Members of the graduate faculty, who are appointed by the dean with the approval of the Graduate Council, fall into two categories in accordance with their function: the Graduate Studies Faculty (GSF), who are appointed to teach graduate courses and to direct master's theses, and the Doctoral Research Faculty (DRF), who are appointed in addition to direct doctoral dissertations. No staff member is expected to perform any of these functions without having been appointed to the graduate faculty, though temporary exceptions may be made in unusual circumstances.

In the beginning the organization of graduate study was very informal. Control was in the hands of a faculty committee which reported directly to the President. In 1910, however, James N. Anderson, Head of the Department of Ancient Languages, was appointed Dean of the College of Arts and Sciences and Director of Graduate Work, and in 1930 he became the first Dean of the Graduate School. He was succeeded upon his retirement in 1938 by T. M. Simpson, Head of the Department of Mathematics, who held the position until 1951. C. F. Byers, Head of the Department of Biological Sciences in the University College, served as Acting Dean from June 1951 until August 1952 when he was succeeded by L. E. Grinter, who came from the Illinois Institute of Technology, where he had been Vice President, Dean of the Graduate School, and Research Professor. Upon becoming Acting Vice President in 1969, Dr. Grinter was named Dean *Emeritus* of the Graduate School. He was succeeded by Harold P. Hanson, who came to Florida from the University of Texas, where he had served as Chairman of the Department of Physics. In 1971, Dr. Hanson was appointed Vice President for Academic Affairs. Alexander G. Smith of the Department of Physics and Astronomy and a former assistant dean of the Graduate School, served as Acting Dean until the appointment of Harry H. Sisler. Dr. Sisler served as Chairman of the Department of Chemistry, Dean of the College of Arts and Sciences, and Executive Vice President of the University of Florida prior to being named Dean of the Graduate School in March 1973. In September 1979, Dr. Sisler returned to teaching as Distinguished Service Professor of Chemistry and F. Michael Wahl was appointed Acting Dean. Dr. Wahl came to Florida from the University of Illinois in 1969. He served as Professor and Chairman of the Department of Geology from 1969 to 1973 when he was named Associate Dean of the Graduate School.

Study leading to graduate degrees has existed at the University of Florida from the date of the establishment of the University on its present campus. The first M.A. was awarded in 1906, the major being English, and the first M.S. in 1908, with a major in entomology. The first programs leading to the Ph.D. were initiated in 1930, and the first degrees were awarded in 1934, one with a major in chemistry and the other with a major in pharmacy. The first Ed.D. was awarded in 1948. Graduate study has had a phenomenal growth at the University of Florida. In 1930, 33 degrees were awarded in 12 fields. In 1940, 66 degrees were awarded in 16 fields. In 1978-79 the total number of graduate degrees awarded was 1,462 in more than 90 fields. The proportion of doctoral degrees has increased steadily. In 1950, 18 Ph.D.'s and 5 Ed.D.'s were awarded. In 1978-79 the total was 286 Ph.D.'s and 27 Ed.D.'s

GRADUATE DEGREES AND PROGRAMS

Refer to the section of this *Catalog* entitled *Fields of Instruction* for specializations in the approved programs.

NONTHESIS DEGREES

(Asterisk (*) indicates thesis option)

Master of Accounting (M.Acc.)*

Master of Agriculture (M.Ag.), with program in one of the following:

- Agricultural and Extension Education
- Agronomy
- Animal Science
- Botany
- Dairy Science
- Entomology and Nematology
- Food Science and Human Nutrition
- Horticultural Science:
  - *Fruit Crops*
  - *Ornamental Horticulture*
  - *Vegetable Crops*
- Plant Pathology
- Poultry Science
- Soil Science

Master of Agricultural Management and Resource Development (M.A.M.R.D.) with program in Food and Resource Economics.

Master of Arts in Teaching (M.A.T.) with program in one of the following:

- Anthropology
- English
- French
- Geography
- German
- History
- Latin
- Latin American Area Studies
- Linguistics
- Mathematics
- Philosophy
- Political Science
- Political Science—International Relations
- Psychology
- Sociology
- Spanish
- Speech

Master of Building Construction (M.B.C.)

Master of Business Administration (M.B.A.) with program in business administration:

- *Accounting*
- *Economics*
- *Finance*
- *Health and Hospital Administration*
- *Insurance*
- *Management*
- *Marketing*
- *Real Estate and Urban Analysis*

Master of Education (M.Ed.) with program in one of the following:

Childhood Education
Counselor Education (available only in conjunction with Ed.S. degree)
Curriculum & Instruction
Educational Administration
Foundations of Education
Music Education
Secondary Education
Special Education
Vocational, Technical, Adult Education

Master of Engineering (M.E.) with program in one of the following:

Aerospace Engineering*
Agricultural Engineering*
Chemical Engineering*
Civil Engineering*
Coastal and Oceanographic Engineering*
Electrical Engineering*
Engineering Mechanics*
Engineering Science*
Environmental Engineering Sciences*
Industrial and Systems Engineering*
Mechanical Engineering*
Metallurgical and Materials Engineering*
Nuclear Engineering Sciences*

Master of Forest Resources and Conservation (M.F.R.C.)
Master of Health Education (M.H.Ed.)
Master of Health Science (M.H.S.) with program in one of the following:

Occupational Therapy
Rehabilitation Counseling

Master of Laws in Taxation (LL.M. in Tax.)
Master of Nursing (M.Nsg.)
Master of Physical Education (M.P.E.)
Master of Science in Teaching (M.S.T.) with program in one of the following:

Astronomy
Botany
Chemistry
Geography
Geology
Mathematics
Microbiology
Physics
Psychology
Zoology

Master of Statistics (M.Stat.)
Engineer (Engr.)—A special degree requiring one year of graduate work beyond the master's degree. For a list of the approved programs, see those listed above for the Master of Engineering degree. (Thesis optional.)
Specialist in Education (Ed.S.)— A special degree requiring one year of graduate work beyond the master's degree. For a list of the approved programs, see those listed below for the Doctor of Education degree.

THESIS DEGREES

(Dagger (†) indicates nonthesis option)

Master of Arts (M.A.) with program in one of the following:

Anthropology†
Business Administration:
Finance
Insurance
Management
Marketing
Real Estate and Urban Analysis
Economics†
English†
French†
Geography
German
History
Latin
Latin American Area Studies
Linguistics
Mathematics†
Philosophy†
Political Science†
Political Science—International Relations†
Psychology†
Sociology
Spanish†
Speech

Master of Arts in Architecture (M.A.Arch.)
Master of Arts in Education (M.A.E.). For a list of the programs, see those listed above for the Master of Education degree.
Master of Arts in Health Education (M.A.H.Ed.)
Master of Arts in Journalism and Communications (M.A.J.C.) with program in Communication.
Master of Arts in Physical Education (M.A.P.E.)
Master of Fine Arts (M.F.A.) with program in one of the following:

Art
Music
Theatre

Master of Arts in Urban and Regional Planning (M.A.U.R.P.)
Master of Science (M.S.) with program in one of the following:

Aerospace Engineering†
Agricultural Engineering†
Agricultural and Extension Education
Agronomy
Animal Science
Astronomy†
Biochemistry and Molecular Biology
Botany
Chemical Engineering†
Chemistry
Civil Engineering†
Coastal and Oceanographic Engineering†
Computer and Information Sciences
Dairy Science
Electrical Engineering†
Engineering Mechanics†
Engineering Science†
Entomology and Nematology
Environmental Engineering Sciences†
Food and Resource Economics
Food Science and Human Nutrition
Forest Resources and Conservation
Geography
Geology
Horticultural Science:
Fruit Crops
Ornamental Horticulture
Vegetable Crops
Industrial and Systems Engineering†
Mathematics†
Mechanical Engineering†
Medical Sciences:
Anatomical Sciences
Immunology and Medical Microbiology
Neuroscience
Pathology
Pharmacology
Physiology
Metallurgical and Materials Engineering†
Microbiology†
Nuclear Engineering Sciences†
Physics†
Plant Pathology
Poultry Science
Psychology†
Soil Science
Veterinary Science
Zoology†

Master of Science in Building Construction (M.S.B.C.)
Master of Science in Nursing (M.S.Nsg.)
Master of Science in Pharmacy (M.S.P.) with program in Pharmaceutical Sciences:

Medicinal Chemistry
Pharmacy

Master of Science in Statistics (M.S.Stat.)
Doctor of Education (Ed.D.) with program in one of the following:

Counselor Education
Curriculum and Instruction
Educational Administration
Foundations of Education
Special Education

Doctor of Philosophy (Ph.D.) with program in one of the following:

Aerospace Engineering
Agronomy
Animal Science
Anthropology
Astronomy
Biochemistry and Molecular Biology
Botany
Business Administration
Chemical Engineering
Chemistry
Civil Engineering
Counselor Education
Curriculum and Instruction
Economics
Educational Administration
Electrical Engineering
Engineering Mechanics
English
Entomology and Nematology
Environmental Engineering Sciences
Food and Resources Economics
Food Science and Human Nutrition

Forest Resources and Conservation
Foundations of Education
Geography
History
Horticultural Science:
Fruit Crops
Ornamental Horticulture
Vegetable Crops
Industrial and Systems Engineering
Linguistics
Mathematics
Mechanical Engineering
Medical Sciences:
Anatomical Sciences
Immunology and Medical Microbiology
Neuroscience
Pathology
Pharmacology
Physiology
Metallurgical and Materials Engineering
Microbiology
Nuclear Engineering Sciences
Pharmaceutical Sciences:
Medicinal Chemistry
Pharmacy
Philosophy
Physics
Plant Pathology
Political Science
Political Science—International Relations
Psychology
Romance Languages:
French
Spanish
Sociology
Soil Science
Special Education
Speech
Statistics
Zoology

ADMISSION TO THE GRADUATE SCHOOL

Application for Admission.—Admission forms and information concerning admission procedures may be obtained from the Registrar and Admissions Office, 135 Tigert Hall. Prospective students are urged to apply for admission as early as possible. For some departments deadlines for receipt of admission applications may be earlier than those stated in the current *University Calendar;* prospective students should check with the appropriate department. Applications which meet minimum standards are referred to the graduate selection committees of the various colleges and departments for approval or disapproval.

To be admitted to graduate study in a given department, the prospective student must satisfy the requirements of the department as well as those of the Graduate School. In some departments, available resources limit the number of students that can be admitted.

General Requirements.—The Board of Regents has established the following minimum standards for first-time admission to a master's or doctoral degree program in the State University System: a grade of B or better for all upper-division undergraduate work or a total Verbal-Quantitative score of 1000 or higher on the Aptitude Test of the Graduate Record Examination. It must be emphasized that these are *minimum* standards for the State University System, and satisfaction of these Board of Regents minimum criteria is not sufficient for admission to graduate study at the University of Florida.

The Graduate School, University of Florida, requires *both* a minimum grade average of B for all upper-division undergraduate work *and* a minimum Verbal-Quantitative total score of 1000 on the Aptitude Test of the Graduate Record Examination. For some departments, and in more advanced levels of graduate study, an undergraduate average or Graduate Record Examination scores above those stated for the Graduate School may be required. These criteria are on file in the Office of the Graduate School. Some colleges and departments require a reading knowledge of at least one foreign language. Exceptions to the above requirements are made only when these and other criteria such as letters of recommendation are reviewed by the department, recommended by the department, and approved by the Dean of the Graduate School.

Unqualified admission to the Graduate School is dependent upon the presentation of a baccalaureate degree from an accredited college or university. No application will be considered unless the complete official transcript of all the applicant's undergraduate and graduate work is in the possession of the Registrar, and no transcript will be accepted as official unless it is received directly from the registrar of the institution in which the work was done. Official supplementary transcripts are required as soon as they are available for any work completed after application for admission has been made. In general, no student who is a graduate of a nonaccredited institution will be considered for graduate study in any unit of the University.

The Board of Regents has also ruled that in admitting students for a given academic year, up to 10% may be admitted as exceptions. Students admitted as exceptions under the 10% waiver rule must present both an upper-division grade point average and Graduate Record Examination Aptitude Test Score with their application and meet other criteria required by the University, such as excellent letters of recommendation from trusted colleagues, satisfactory performance in a specified number of graduate courses taken as postbaccalaureate students, or practical experience in the discipline for a specified period of time.

The University encourages applications from qualified applicants of both sexes from all cultural, racial, religious, and ethnic groups. The University does not discriminate on the basis of handicap in admission or access to its programs and activities.

GRADUATE RECORD EXAMINATION (GRE)

In addition to the Aptitude Test of the Graduate Record Examination which is required of all applicants, some departments encourage the applicant to submit scores on one or more advanced subject tests of the Graduate Record Examination. The scores on all tests taken will be considered in regard to admission.

Postponement of the Graduate Record Examination.—In the event that an applicant takes the GRE Aptitude Test too late for the results to reach the Admissions Office before the proposed date of entry, the student may apply for conditional admission to the Graduate School with postponement of the GRE Aptitude Test provided satisfactory scores on the Miller Analogies Test (MAT) are submitted. The scores on the Miller Analogies Test will be used as a partial basis for deciding whether conditional admission may be granted. The Miller Analogies Test is *not* a substitute for the Graduate Record Examination. In cases where conditional admission is granted based on the scores of the Miller Analogies Test, it is for *one* term only. Satisfactory scores on the GRE Aptitude Test must be submitted before a second registration will be permitted.

The decision on postponing the Graduate Record Examination Aptitude Test will be based on the scores on the Miller Analogies Test and the academic

credentials submitted. If these scores and academic credentials are not satisfactory, submission of the results of the GRE Aptitude test will be required before an admission decision is reached. It should be noted that the Miller Analogies Test may not be repeated until at least one year has elapsed.

Graduate Study in Business Administration.—Students applying for admission to the Graduate School for study in the College of Business Administration may substitute satisfactory scores on the Graduate Management Admission Test (GMAT) for the Graduate Record Examination. Students applying for admission to the Master of Business Administration (MBA) program must submit satisfactory scores on the GMAT. Applicants are requested to contact the Educational Testing Service, Princeton, New Jersey, for additional information.

Graduate Study in Law.—Students applying to the graduate program leading to the degree Master of Laws in Taxation must submit satisfactory scores on the Law School Admissions Test (LSAT).

FOREIGN STUDENTS

All foreign students seeking admission to the Graduate School are required to submit satisfactory scores on the GRE Aptitude Test and on the TOEFL (Test of English as a Foreign Language) with the following exceptions:

1. Foreign students whose native tongue is English or who have studied at a United States college or university for one year or more need not submit TOEFL scores but must submit satisfactory scores on the Aptitude Test of the Graduate Record Examination before their application for admission can be considered.
2. Students educated in foreign countries who apply for admission while residing outside the United States may be granted a one quarter postponement of the GRE but not the TOEFL. Permission to register for subsequent quarters will depend upon the submission of scores on the Graduate Record Examination.
3. All foreign students applying for admission to the Master of Business Administration program must submit satisfactory scores from the Graduate Management Admission Test before their applications for admission can be considered.

Applicants are requested to write the Educational Testing Service, Princeton, New Jersey, for registration forms and other information concerning TOEFL, GMAT, and GRE.

CONDITIONAL ADMISSION

Students may be given conditional admission to the Graduate School to ascertain their ability to pursue graduate work successfully where previous grade records or Graduate Record Examination scores are on the borderline of acceptability.

Students granted conditional admission should be notified by the major department of the conditions under which they are admitted. When these conditions have been satisfied, the department must notify the student in writing, sending a copy of notification to the Graduate School. Work taken while a student is in conditional status may be applied toward a graduate degree.

POSTBACCALAUREATE STUDENTS

Students who have received a bachelor's degree but have *not* been admitted to the Graduate School are classified as postbaccalaureate students (6—) and may enroll in courses for any of the following reasons: (1) to validate undergraduate records from nonaccredited and unevaluated colleges; (2) to provide a means for students *not seeking a graduate degree* to enroll in courses — included in this category would be students who change their professional goals or wish to expand their academic background; and (3) to accommodate students who *do intend* to enter a graduate program at some future date, but need a substantial number of prerequisite courses.

Postbaccalaureate students may enroll in graduate courses but the work taken will not normally be transferred to the graduate record if the student is subsequently admitted to the Graduate School. By petition in clearly justified cases, it is possible to transfer up to but no more than 10 quarter hours of course work earned with a grade of A, B+, or B.

Students in the College of Education who desire postbaccalaureate classification to obtain teacher certification must provide the college with a clear statement of certification goals as a part of the requirements for admission. Interested students should write to 134 Norman Hall or call 392-0721 for further information.

FACULTY MEMBERS AS GRADUATE STUDENTS

Members of the faculty of the University of Florida with a rank of instructor or above (or equivalents), except Florida Cooperative Extension Service (IFAS) county personnel, may not receive a graduate degree from this institution. Exceptions to this policy must be approved by the Graduate Council. Faculty members may register for work in the Graduate School.

STATE UNIVERSITY SYSTEM PROGRAMS

Traveling Scholar Program.—The State University System affords, under the Traveling Scholar Program, an opportunity for graduate students to take courses or conduct research activities at any of the universities in the State System. Course work taken under the auspices of the Traveling Scholar Program at another university in the State System will apply for graduate credit at the student's home campus. The deans of the graduate schools of the state universities are the coordinators of the program, and interested students should contact the dean of the graduate school on their home campus for additional information.

Cooperative Degree Programs.—In certain degree programs, faculty from other universities in the State University System hold graduate faculty status at the University of Florida. In those approved areas, the intellectual resources of these external graduate faculty members are available to students at the University of Florida.

GENERAL REGULATIONS

It is the responsibility of the graduate student to become informed and to observe all regulations and procedures required by the program the student is

pursuing. The student must be familiar with those sections of the *Graduate Catalog* that outline general regulations and requirements, specific degree program requirements, and the offerings and requirements of the major department. **Ignorance of a rule does not constitute a basis for waiving that rule.** Any exceptions to the policies stated in the *Graduate Catalog* must be approved by the Dean of the Graduate School.

After admission to the Graduate School, but before the first registration, the student should consult the college and/or the graduate coordinator in the major department concerning courses and degree requirements, deficiencies if any, and special regulations of the department. The dean of the college in which the degree program is located or a representative must approve all registrations.

STUDY LOADS

The University of Florida operates on a quarter system consisting of four 10-week periods of instruction and examination. A credit under the quarter system is equal to 2/3 of a semester credit.

Maximum registration for a full-time graduate student is 20 credits. Minimum registration for a full-time graduate student is 12 credits. The maximum and minimum registrations are reduced for those students who are graduate assistants or are otherwise employed. Guidelines for the maximum and minimum registration for students on appointment are provided in the Graduate Coordinator's Manual. Any student on appointment who wishes to register for more than the maximum or less than the minimum credits must have the written permission of the Dean of the Graduate School.

Students not on appointment are assumed to be full-time and must register for a minimum of 12 credits. Part-time status may be approved by the Graduate Coordinator for students who are not pursuing a degree on a full-time basis. Such exceptions must be clearly justified and the approved registration must be commensurate with the use of University facilities and faculty time.

COURSES AND CREDITS

Undergraduate courses (1000-2999) may not be used as any part of the graduate degree requirements. Undergraduate courses (3000-4999) may be used for *minor* credit when taken as part of an approved graduate program.

Courses numbered 5000 and above are limited to graduate students, with the exception described under *Undergraduate Registration in Graduate Courses*. Courses numbered 7000 and above are designed primarily for advanced graduate students.

A complete list of approved graduate courses appears in the section of this *Catalog* entitled *Fields of Instruction*. Departments reserve the right to decide which of these graduate courses will be offered in a given quarter and the departments should be consulted concerning available courses.

Correspondence Work.—No courses taken by correspondence may be used for graduate credit.

Extension Work.—No extension courses may be used for graduate credit except in programs for the M.Ag., M.Ed., M.A.E., M.A.T., M.S.T., M.H.Ed., M.P.E., and Ed.S. degrees. Extension work taken at another institution, except through the Board of Regents Office of Continuing Education, may not be transferred to the University of Florida for graduate credit.

State Centers for Continuing Education.—Course work is available in the graduate residence centers established in the state. The amount of credit acceptable for transfer to a degree program varies according to the degree sought. Residence center work is not transferable to all degree programs and the student should consult the requirements for specific degrees in this *Catalog* for additional information.

Cooperative Education Program.—At the University of Florida, the Cooperative Education Program is offered primarily for undergraduate students. However, the course, 4949, Cooperative Work Experience, 3 to 5 credits, may be recommended to the Graduate School for minor credit in master's degree programs provided this course is above the minimum course requirements for the degree.

GRADES

The only passing grades for graduate students are A, B+, B, C+, C, and S. Grades of C+ and C in courses below 5000 level are acceptable for credit toward graduate degrees if the total program meets the B average requirement. In 5000-level courses and above, C+ and C grades count toward a graduate degree if an equal number of credit hours in courses numbered 5000 or higher have been earned with grades of B+ and A, respectively. Grade points are not designated for S and U grades; these grades are not used in calculating the grade-point average.

Grades of S and U are the only grades awarded in courses numbered 6910 (Supervised Research), 6940 (Supervised Teaching), 6971 (Master's Research), 6973 (Individual Project), and 7980 (Doctoral Research).

Additional courses for which S and U grades apply are noted in the departmental offerings. With the exception of those courses listed in the *Graduate Catalog*, no course taken for an S/U grade may be used to satisfy the minimum requirements for a graduate degree.

Graduate students are not permitted to repeat courses in which they have received failing grades.

Deferred Grade H.—In special situations where it is not possible to assign a regular grade at the end of a term a deferred grade (H) may be assigned. This grade may be used only in special situations where the expected unit of work may be developed over a period of time greater than a single term. The grade of H is not a substitute for a grade of S, U, or I. Courses for which H grades are appropriate must be so noted in their catalog descriptions, and must be approved by the Graduate Curriculum Committee and the Graduate Council.

Incomplete Grades.—Grades of I (incomplete) received during the preceding quarter must be removed by the deadline date stated in the *University Calendar*. If the grade of I has not been changed accordingly, the Office of the Registrar will record a grade of E for the course. **All grades of I must be removed prior to the award of a graduate degree.**

UNDERGRADUATE REGISTRATION IN GRADUATE COURSES

With permission of the instructor and the college concerned, an undergraduate student at the Univer-

sity of Florida may enroll in graduate-level courses (5000 and 6000 level) if the student has senior standing and an upper-division grade-point average of at least 2.8. After a student has been accepted in the Graduate School, up to 10 hours of graduate-level courses earned with a grade of A, B+, or B taken under this provision may be applied toward a graduate degree at the University of Florida provided credit for the course has not been used for an undergraduate degree.

CONCURRENT GRADUATE PROGRAMS

A graduate student who wishes to pursue degrees in two programs concurrently must have the written approval of the chairperson of each department involved and the Dean of the Graduate School. If the request is approved, the student must be officially admitted to both programs through regular procedures. If the student is approved to pursue two master's programs, no more than 10 hours of course work from one degree program may be applied toward meeting the requirements for the second master's degree.

INFORMATION FOR VETERANS

The University of Florida is approved for the education and training of veterans under all public laws in effect; i.e., Chapter 31, Title 38, U.S. Code (Disabled Veterans); Chapter 34, Title 38, U.S. Code (Cold-War G.I. Bill); and Chapter 35, Title 38, U.S. Code (Children of Deceased or Disabled Veterans).

Students who may be eligible for educational benefits under any Veterans Administration program are urged to contact the Veterans Affairs Office, 124 Tigert Hall, as soon as they are accepted for admission.

Students expecting to receive benefits under one of these programs must file an application with the Office of the Registrar. No certification can be made until the application is on file. Benefits are determined by the Veterans Administration, and the University certifies according to these rules and regulations.

The Registrar's Office maintains students' academic records. A progress report is sent to each student at the end of the term indicating grades, cumulative hours, grade points, etc. For information on student conduct policies see *Undergraduate Catalog.*

UNSATISFACTORY SCHOLARSHIP

Any graduate student may be denied further registration in the University or in a graduate program should progress toward completion of the planned program become unsatisfactory to the department, college, or Dean of the Graduate School. Failure to maintain a B average in all work attempted is, by definition, unsatisfactory progress.

CHANGE OF MAJOR OR COLLEGE

Graduate students who wish to change their major or college must make formal application through the Office of the Registrar and receive approval of the appropriate department chairperson, college dean, and the Dean of the Graduate School. Deadline dates for such changes as specified in the current *University Calendar* must be met.

FOREIGN LANGUAGE EXAMINATION

A foreign language examination is not required for all degree programs and the student should contact the graduate coordinator in the appropriate department for specific information regarding any requirement of a foreign language.

If a department requires that a student meet the foreign language requirement by satisfactory performance on the Graduate School Foreign Language Tests (GSFLT) in French, Spanish, or German, the student should contact the Graduate School for applications and payment of fees. The application deadline dates and examination times, and dates are listed in the *University Calendar.* Educational Testing Service (ETS) no longer administers this examination and does not accept application fees or issue tickets of admission for these tests. Registration for these examinations and payment of fees will be handled by the Office of Instructional Resources, 1012 General Purpose Building A.

ADMISSION TO CANDIDACY

Admission to candidacy is not automatic. **It requires a formal application distinct from registration** on or before the dates stipulated in the current *University Calendar.* Admission to candidacy depends, among other requirements, upon the maintenance of a B average or higher in the major and in all work attempted. All grades of I and X must be removed.

EXAMINATIONS

The student's supervisory committee is responsible for the administration of the written and oral qualifying examinations as well as the final oral examination for the defense of the thesis or dissertation. *All* members of the supervisory committee must sign the appropriate forms, including the signature pages, in order for the student to satisfy the requirements of the examination.

PROCEDURE FOR FINAL QUARTER

It is the student's responsibility to ascertain that all requirements have been met and that every deadline is observed. Deadline dates are set forth in the *University Calendar* and by the college, school, or department. Regular issues of *Deadline Dates* are available each quarter.

When the dissertation or thesis is ready to be put in final form, the student should get instructions from the Graduate School Editorial Office and should request a records check in the Student Information and Records Office to make certain that *all* requirements for graduation have been fulfilled.

When a student registers for the last term, the appropriate fees for the Library permanent binding of two copies and for microfilming the dissertation must be paid by the deadline specified in the *University Calendar.*

A student must be registered for an appropriate load in the University for the term in which the final examination is given and at the time the degree is received.

AWARDING OF DEGREES

The Graduate School will authorize a candidate to be awarded the degree appropriate to the course of study under the following conditions, the details of which can be found under the descriptions of the several degrees.

1. The candidate must have completed all course requirements, including an internship or practicum if required, in the major and minor fields, observing time limits, limitations on transfer credit, on nonresident work, and on level of course work.
2. The candidate must have a grade average of B or higher in the major and in all work attempted in the graduate program. All grades of I and X must be removed.
3. The candidate must have satisfactorily completed all required examinations, qualifying, comprehensive, and final, and be recommended for the degree by the supervisory committee, major department, and college.
4. The dissertation or, if required, thesis or equivalent project, must have been approved by the supervisory committee and accepted by the Graduate School. Recommendations for the awarding of a degree include meeting all academic and professional qualifications as judged by the faculty of the appropriate department.
5. All requirements for the degree must be met while the candidate is a registered graduate student. Students who have been registered in the Graduate School at least one quarter of each successive calendar year may graduate according to the curriculum under which they entered, provided the courses are still offered by the University.

ATTENDANCE AT COMMENCEMENT

Graduates who are to receive advanced degrees are urged to attend Commencement in order to accept personally the honor indicated by the appropriate hood. The student may arrange through the University Bookstore for the proper academic attire to be worn at Commencement.

REQUIREMENTS FOR MASTER'S DEGREES

GENERAL REGULATIONS

The following regulations represent those of the Graduate School. Colleges and departments may have additional regulations beyond those stated below. **Unless otherwise indicated in the following sections concerning master's degrees, these general regulations apply to all master's degree programs at the University.**

Course Requirements.—Graduate credit is awarded for courses numbered 5000 and above. At least 50% of the minimum course work for a master's degree must be in graduate level courses. Courses numbered 3000 and above may be accepted only for minor credit when taken as a part of an approved graduate program. The program of course work for a master's degree must be approved by the student's adviser, supervisory committee, or representative of the department. No more than 10 credits from a previous master's degree program may be applied toward a second master's degree.

If a minor is chosen, at least eight credits of work are required in the minor field. Two eight credit minors may be taken with departmental permission. **Minor work must be in a department other than the major;** in special cases this requirement may be modified, but only with the written permission of the Dean of the Graduate School.

Degree Requirements.—Unless otherwise specified, for any master's degree, the student must earn a minimum of 45 credits as a graduate student at the University of Florida, of which no more than 10 quarter hours of course work earned with a grade of A, B+, or B may be transferred from institutions approved for this purpose by the Dean of the Graduate School.

Transfer of Credits.—Only graduate level courses to the extent of 10 quarter hours earned with a grade of A, B+, or B may be transferred from an institution approved for this purpose by the Graduate School. Credits transferred will be applied toward meeting the degree requirements but the grades earned will not be computed in the student's grade-point average. Acceptance of transfer credit requires approval of the student's supervisory committee and the Dean of the Graduate School. Nonresident or extension work taken at another institution with the exception of work taken through the Board of Regents Office for Continuing Education, may not be transferred to the University of Florida for graduate credit. No courses taken by correspondence may be used toward a graduate degree.

Supervisory Committee.—Supervisory committees for graduate degree programs are nominated by the representative department chairperson, approved by the college dean, and appointed by the Dean of the Graduate School. Only members of the graduate faculty may be appointed to supervisory committees. The Dean of the Graduate School is an ex-officio member of all supervisory committees.

The supervisory committee for a master's degree with a thesis must consist of at least two members selected from the graduate faculty. The supervisory committee for a master's degree without a thesis may consist of one member of the graduate faculty who advises the student and oversees the program. If a minor is designated, the committee should include one member of the minor department who has been appointed to the graduate faculty.

Admission to Candidacy.—Application should be made through the department no later than the last day of classes in the quarter **preceding** the quarter in which the student expects to receive the degree. The Graduate Council reserves the right to deny degrees to persons who have failed to comply with this regulation at the proper time. The student must have a B average for all graduate work completed and in all work attempted in order to be admitted to candidacy.

Language Requirements.—(1) The requirement of a reading knowledge of a foreign language is at the discretion of the department. The foreign language requirement varies from department to department and the student should check with the appropriate department for specific information. (2) The ability to use the English language correctly and effectively, as judged by the supervisory committee, is required of all candidates.

Examination.—A final comprehensive examination, oral, written or both, must be passed by the candidate. This examination will cover at least the

candidate's field of concentration, and in no case may it be scheduled earlier than six months before the degree is to be conferred.

Time Limitation.—All work counted toward the master's degree must be completed during the seven years immediately preceding the date on which the degree is to be awarded.

MASTER OF ARTS AND MASTER OF SCIENCE

The requirements for the Master of Arts and the Master of Science degrees also apply to the following degrees, except as they are individually described hereafter: Master of Arts in Education, Master of Arts in Health Education, Master of Arts in Journalism and Communications, Master of Arts in Physical Education, Master of Science in Building Construction, and Master of Science in Pharmacy.

Course Requirements.—The minimum couse work required for a master's degree with thesis is 45 credits including up to nine hours of the research course numbered 6971. All students seeking a master's degree with thesis must register for an appropriate number of hours in 6971. The minimum course work requirement for a master's degree without a thesis or the master's taken with the nonthesis option is 48 credits excluding credits for which grades of S and U are given. Students pursuing the nonthesis option may not use courses numbered 6971 or 7980 to meet the credit requirement. Students who elect the nonthesis option may enroll for 6910—Supervised Research, or 6940—Supervised Teaching in their final term. Since 6910 and 6940 courses are graded S/U registration in these courses must be in excess of the 48 credit minimum requirement for the degree.

For both nonthesis option and thesis programs at least half the required credits, exclusive of 6971 or 7980, must be in a field of study designated the major. One or two minors of at least eight credits each may be taken, but a minor is not required by the Graduate School. Minor work must be in a department other than the major except in music. The work in the major field must be in courses numbered 5000 or above. For work outside the major, courses numbered 3000 or above may be taken.

Thesis.—Candidates for the master's or Engineer degree with thesis must prepare and present theses (or equivalent in creative work) acceptable to their supervisory committees and the Graduate School. The candidate should consult the Graduate School Editorial Office for instructions concerning the form of the thesis. The *University Calendar* specifies final dates for submitting three copies of the abstract to the office of the Dean of the Graduate School and for submitting the original copy of the thesis bound with an abstract. The college copy should be submitted to the college or department by the specified date. Two title pages should be inserted in the original and college copies. After the thesis is accepted, these two copies will be permanently bound and deposited in the University Libraries.

Change from Thesis to Nonthesis Option.—A student who wishes to change from the thesis to the nonthesis option for the master's degree must obtain the permission of the supervisory committee to make such a change. This permission must be forwarded to the Graduate School at least one full quarter prior to the intended date of graduation. The candidate must meet all the requirements of the nonthesis option as specified above. A maximum of five credits earned in 6971 (Master's Research) can be counted toward the degree requirements only if converted to credit as Individual Work. The supervisory committee must indicate that the work was productive in and by itself and warrants credit as a special problem or special topic course.

Supervisory Committee.—The student's supervisory committee should be appointed as soon as possible after the student has been admitted to the Graduate School but, in no case, later than the end of the second quarter of study. The duties of the supervisory committee are to advise the student, to check on the student's qualifications and progress, to supervise the preparation of the thesis, and to conduct the final examination.

Admission to Candidacy.—Application for admission to candicacy for the master's degree should be made no later than the last day of classes in the quarter **prior** to the quarter in which the student plans to receive the degree.

The Graduate Council may deny degrees to persons who have failed to comply with this regulation at the proper time. In order to be admitted to candidacy, the student must have (1) maintained a B average or higher in the major and in all work attemped, (2) chosen a thesis topic, (3) satisfied the supervisory committee, department chairperson and the college dean that the student is qualified to become a candidate for the degree. It is the responsibility of the supervisory committee at this time to make such investigation as is necessary to determine the student's eligibility.

Comprehensive Examination.—The student who elects the nonthesis option must pass a comprehensive written examination on the major field of study and on the minor if a minor is designated. This comprehensive examination must be taken within six months of the date the degree is to be awarded.

Final Examination.—When the student's course work is completed, or practically so, and the thesis is in final form, the supervisory committee is required to examine the student orally or in writing on (1) the thesis, (2) the major subjects, (3) the minor or minors, and (4) matters of a general nature pertaining to the field of study.

At least three faculty members must be present at the student's final examination, but only the members of the official supervisory committee are required to sign the final examination report. The thesis must be approved unanimously and signed by the supervisory committee members. A written announcement of the examination must be sent to the Dean of the Graduate School. Using the form provided for the purpose, the supervisory committee shall report in writing to the Dean of the Graduate School not later than one week before the time for conferring the degree whether all work has been completed in a satisfactory manner and whether on the basis of the final examination the student is recommended for a degree. This examination may not be scheduled earlier than six months before the degree is to be conferred without special approval of the Dean of the Graduate School.

MASTER OF ARTS IN TEACHING AND MASTER OF SCIENCE IN TEACHING

These degrees are designed for graduate students majoring in departments of the various colleges of the

University who intend to teach in junior or four year colleges. Requirements for admission are the same as those for the regular M.A. and M.S. degrees in the various colleges, and programs leading to the M.A.T. and M.S.T. may, with proper approval, be incorporated into programs leading to the Ph.D.

The requirements for the degrees are as follows:

1. A reading knowledge of one foreign language if required by the student's major department.
2. Satisfactory completion of at least 54 credits of work while registered as a graduate student; at least 50% of these credits must be in courses open only for graduate credit, with work distributed as follows:
   a. At least 28 credits in the major and eight credits in the minor.
   b. Nine credits in a departmental internship in teaching. Three years of successful teaching experience may be substituted for the internship requirement, and credits thus made available may be used for further work in the major, the minor, or in education.
   c. At least one course in each of the following: educational psychology, sociology, and curriculum dealing with the community college. These courses may be used to comprise a minor.
3. **Off-Campus Work:** A minimum of 12-25 credits (at the department's discretion), including registration for at least nine credit hours in a single quarter, must be earned on the Gainesville campus. Beyond that, credits, including those at the 5000 and 6000 level, earned in courses offered off-campus by the University of Florida which have been approved by the Graduate School shall be accepted, provided they are appropriate to the student's degree program as determined by the supervisory committee.
4. At the completion of this degree, the student, for certification purposes, must present from the undergraduate and graduate degree programs no fewer than 54 quarter credits in the major field.
5. A final comprehensive examination, either written, oral, or both, must be passed by the candidate. This examination will cover the field of concentration and the minor.

MASTER OF ACCOUNTING

The Master of Accounting (M.Acc.) is the professional degree for students seeking careers in public accounting, business organizations, government, or continuation in the Ph.D. program. The M.Acc. program offers specializations in each of the four areas of auditing/financial accounting, management accounting, accounting systems, and taxation.

The requirements for the degree are 54 quarter credits of course work, of which a minimum of 24 quarter credits must be in graduate level accounting courses. At least half of the 54 credits must be in graduate level courses. Courses below the graduate level must have the approval of the major adviser. A final comprehensive examination is required of all students. Additional requirements are listed under the *General Regulations* section for all master's degrees.

MASTER OF AGRICULTURE

The degree of Master of Agriculture is designed for those students who wish additional training for business occupations or professions, rather than for those interested primarily in research.

The general requirements are the same as those for the Master of Science degree without thesis except that 18 credits of graduate courses in a department constitute a major. Credit toward the degree for courses taken through the Division of Continuing Education is limited to 25 credits. The student's supervisory committee must consist of at least 2 members of the graduate faculty. A comprehensive written qualifying examination, given prior to the beginning of the quarter of graduation, and a final oral examination are required.

MASTER OF AGRICULTURAL MANAGEMENT AND RESOURCE DEVELOPMENT (M.A.M.R.D.)

The M.A.M.R.D. degree program provides an opportunity for graduate study for students who plan to enter management careers in business firms or government agencies; it is not recommended for those who plan careers in research and university teaching. Areas of concentration include farm management, agricultural marketing, and resource planning and economic development.

The general requirements are the same as those for the Master of Science degree without thesis except that 18 credits of graduate courses in food and resource economics constitute a major. The supervisory committee and examination requirements are the same as those for the Master of Agriculture degree.

MASTER OF ARTS IN ARCHITECTURE

The degree of Master of Arts in Architecture is a professional degree for those students who wish to qualify for registration as an architect.

The general requirements are the same as those for other Master of Arts degrees with thesis except that the minimum registration required is 76 credits including no more than nine credits in ARC 6971. In some areas, with permission from the departmental graduate faculty, a terminal project requiring nine credits in ARC 6265 may be elected in lieu of a thesis.

MASTER OF ARTS IN URBAN AND REGIONAL PLANNING

The degree of Master of Arts in Urban and Regional Planning is a professional degree for students who wish to practice urban and regional planning and qualify as members of the American Institute of Certified Planners. The program is recognized by the American Planning Association.

The general requirements are the same as those for other Master of Arts degrees with thesis except that the minimum registration required is 72 credits including no more than nine credits in URP 6971. In some study areas, with permission from the departmental graduate faculty, a terminal project requiring nine credits may be elected in lieu of a thesis.

Law/Urban Planning Joint Degree Program.—A four-year program leading to a Juris Doctor and Master of Arts in Urban and Regional Planning is offered under the joint auspices of the College of Law and the College of Architecture, Department of Urban and Regional Planning. The program provides students in-

terested in the legal problems of urban and regional planning with an opportunity to blend law studies with relevant course work in the planning curriculum. The student receives both degrees at the end of a four-year course of study whereas separate programs would require five years. Students must take the GRE and the LSAT prior to admission and must complete the first year of law school course work before comingling law and planning courses. A thesis is required upon completion of the course work.

Interested students should apply to both the Holland Law Center and to the Graduate School, noting on the application the joint nature of their admission requests. Alternatively, students may apply to the Graduate School during their first year of Law School. Further information on the program is available from the Holland Law Center and from the Department of Urban and Regional Planning.

MASTER OF BUILDING CONSTRUCTION

The degree of Master of Building Construction is designed for those students who wish to pursue advanced work in management of construction, construction techniques, and research problems in the construction field.

The general requirements are the same as those for other Master of Science degrees without thesis except that a minimum of 50 credits is required. At least 37 credits must be in the School of Building Construction in graduate level courses of which at least 25 credits must be earned at the 6000 level. The remaining 13 credits may be earned in other departments at the 3000 level or above when these courses are included as a part of an approved program of study. A thesis is not required. A final comprehensive examination is required of all students.

MASTER OF BUSINESS ADMINISTRATION

The requirements for the Master of Business Administration degree are designed to give students (1) the conceptual knowledge for understanding the functions and behavior common to all organizations, and (2) the analytical, problem-solving, and decision-making skills essential for effective management. The emphasis is upon developing the student's capacities and skills for business decision making.

The curriculum is structured so students may deepen their knowledge in a specialized field by selecting an approved concentration. Included in these concentrations are accounting, economics, finance, health and hospital administration, insurance, law, management, marketing, and real estate and urban analysis. Several areas of specialization having different emphases are offered within some concentrations. Students may also expand their knowledge in several areas instead of specializing and pursue a generalist option by selecting approved courses from more than one field of business administration.

Minimum Requirements.—The Master of Business Administration degree requires a minimum of 54 credits in approved courses, excluding credits earned in the foundation sequence or other preparatory courses. A thesis is not required. The typical Master of Business Administration candidate has earned more than 54 credits at the time the degree is awarded.

Admission.—Applicants for admission must submit satisfactory scores on the Graduate Management Admissions Test (GMAT). Applicants whose native language is not English are required to submit, in addition, scores on the Test of English as a Foreign Language (TOEFL).

Undergraduate study in business administration is not a prerequisite for admission to the MBA program. Students with degrees in other majors may obtain the necessary preparation for advanced study after admission.

Information on admission as well as other aspects of the Master of Business Administration program may be obtained by contacting the Director of the Master of Business Administration Program, College of Business Administration, Matherly Hall.

The required courses in the curriculum consist of the foundation sequence, advanced graduate sequence, and the concentration credits.

Students who are qualified for admission to the MBA program, but whose undergraduate work was outside business administration, may obtain the necessary preparation through the foundation sequence for advanced graduate study.

Foundation Sequence.—The following courses constitute the minimum foundation sequence requirements:

ACC 5011—Financial Accounting
CAP 5009—Computer Concepts
ECO 5111—Microeconomic Theory
ECO 5204—Macroeconomic Theory
GEB 5756—Introduction to Managerial Statistics
GEB 5805—Mathematical Methods and Their Application to Business Economic Theory
FIN 5404—Financial Management
MAN 5205—Foundations of Management and Organizational Behavior
MAR 5055—Marketing Principles and Institutions
Legal Environment of Business (one course selected from a list of approved courses)

The above courses are required for all Master of Business Administration candidates except where a student, as a result of prior preparation, demonstrates a satisfactory level of understanding of course material by passing a course exemption examination. Students may waive all or part of the required courses in the foundation sequence by passing exemption examinations.

Advanced Graduate Sequence.—The following courses are required of all MBA candidates and are not subject to waiver by examination:

GEB 6705—Managerial Accounting
GEB 6757—Managerial Quantitative Analysis
FIN 6937—Advanced Finance Topics
MAN 6156—Human Behavior in Organizations
MAN 6721—Business Policy
MAR 6716—Problems and Methods of Marketing Management
STA 6357—Analysis of Decisions Under Uncertainty
STA 6358—Statistical Analysis for Managerial Decisions
Applied Economics in Decision Making (selection of either ECO 6433—Macroeconomic Models and the Firm or ECP 6705—Economics of Business Decisions)

These courses comprise between one-half and two-thirds of the student's program of graduate study beyond the foundation sequence.

Concentration.—A minimum of 18 credits is required in the concentration. At least half of these credits must be in courses approved for graduate

credit. A maximum of nine credits may be taken in undergraduate coursework and counted toward the concentration if approved by the adviser, but credits so used do not count toward the minimum number of 54 credits required for the degree. All courses to be counted toward satisfying the concentration requirement must be approved by the adviser. Some concentrations require more than the minimum of 18 credits and students may be required to take additional preparatory courses if their background is not sufficient.

Concentration in Health and Hospital Administration.—The Master of Business Administration degree with a concentration in health and hospital administration is offered by the College of Business Administration. The foundation sequence is required and the course work in the concentration area is offered through the College of Health Related Professions.

In addition to meeting the usual requirements for admission to the Graduate School, students who apply for this concentration must communicate directly with the Chairman of the Program in Health and Hospital Administration, who will arrange for a personal interview with members of a faculty selection committee. Students are usually accepted for the fall quarter, but may begin at other times if approval is obtained. The number of students accepted for each class is limited and applications submitted after April 1 may not be considered.

JD/MBA Joint Degree Program.—A program of concurrent studies leading to a Juris Doctor and a Master of Business Administration is offered under the joint auspices of the College of Law and the College of Business Administration. Both degrees are awarded after a four-year course of study whereas separate programs would require five years. Students must take both the LSAT and the GMAT prior to admission and meet the curriculum requirements of both degrees. Certain courses may be used in partial satisfaction of both degrees. A thesis is not required.

A student enrolled in the joint degree program may spend the first year in either the College of Law or the College of Business Administration; however, study in the second discipline must begin no later than the beginning of the fifth quarter. This program is not open to students who have already received one of the degrees.

Interested students should apply to both the Holland Law Center and the Graduate School, noting on the application the joint nature of their admission requests. Further information is available from the Holland Law Center and the College of Business Administration.

Comprehensive Examination.—A proficiency examination for all students in the Master of Business Administration program, including the Health and Hospital Administration concentration, is administered by an examining committee appointed from the graduate faculty of the College of Business Administration in the latter part of the term in which the student expects to complete the course work. This examination covers the student's entire program, and must be passed to earn the degree.

MASTER OF EDUCATION

The degree of Master of Education is a professional degree designed to meet the need for professional personnel to serve a variety of functions required in established and emerging educational activities of modern society. A thesis is not required.

A minimum of 50 credits is required in all master's programs with at least half of these credits in courses at the 5000 level or above. Thirty-two credits in education, with 24 at the graduate level, and eight credits in courses outside education are included. Two exceptions are (1) only 16 credits in education, all at the graduate level, are required for students having at least 32 credits in a baccalaureate program for teacher preparation, and (2) 24 credits in courses outside education are required for these same students if their master's programs are in subject specialization teacher education, vocational, technical and adult education, or foundations of education.

At least 25 credits must be earned while enrolled as a graduate student in courses offered on the Gainesville campus of the University of Florida, including registration for at least nine credits in a single quarter.

MASTER OF ENGINEERING

A student seeking a master's degree in the field of engineering may become a candidate for the Master of Engineering degree with or without thesis, provided such a candidate has a bachelor's degree in engineering from an ECPD-accredited curriculum or has taken sufficient articulation course work to meet the minimum requirements specified by ECPD. Students who do not meet these requirements may become a candidate for the Master of Science degree, provided they meet departmental requirements for admission. The general intent in making this distinction is to encourage those who are professionally oriented to seek the Master of Engineering degree, and those who are more scientifically oriented and those who have science-based backgrounds to seek the Master of Science degree.

Work Required.—The minimum course work required for the master's degree with thesis is 45 credits which may include up to nine credits of the research course numbered 6971 in all departments. A minimum of 48 credits of course work is required, with at least 24 credits in the student's major field for both of the above degrees without thesis. At least 50% of the required 48 credits must be in graduate level courses, excluding those graded as S/U. Courses in the major must be graduate level. If a minor is chosen, at least eight credits of work are required; two eight-credit minors may be taken. In addition, a multidisciplinary minor in departments other than the major may be authorized by the supervisory committee or program adviser. Courses numbered 3000 and above may be taken for the minor.

Degree Credit.—In order to qualify for course work toward the Master of Engineering degree, a student must first be admitted to the Graduate School at the University of Florida. The amount of course work toward this degree that may be taken at an off-campus center will depend upon the student's individual program and the courses provided through the center.

Examinations.—A student seeking the Master of Engineering degree with or without thesis is required to pass a comprehensive oral or written examination at the completion of the course work. A student who is a candidate for a nonthesis degree who takes less than half the course work on the Gainesville campus will be required to pass a comprehensive written examination administered on the University of Florida campus by an examining committee recommended by the Dean of the College of Engineering and ap-

pointed by the Dean of the Graduate School. At least one member of the examining committee must be either the student's program adviser or a member of the supervisory committee. If a minor is taken, another member selected from the Graduate Studies Faculty must be chosen from outside the major department to represent the student's minor.

The requirement for an on-campus comprehensive written examination also applies to the nonthesis option of the Master of Science degree for students in the College of Engineering.

Examination requirements for the Master of Science degree are covered in the section Master of Arts and Master of Science.

MASTER OF FINE ARTS

The College of Fine Arts offers the Master of Fine Arts degree with majors in art, music, and theatre. The requirements for this degree are the same as those for the Master of Arts with thesis except that a minimum of 72 credits is required, including 9 to 15 credits in 6971 (Research for Master's Thesis). Students may elect to substitute 6973 (Individual Project), creative work in lieu of the written thesis. Students intending to pursue this option must consult the department for specific procedures related to their discipline. The following are general requirements common to all departments in the college:

1. Approval of a proposed research project must be obtained from the student's supervisory committee.
2. The proposal must include a description of the nature of the project, the method and sources of research material, and how the research project will be recorded—i.e., slides, tapes, scripts, program notes, etc.
3. Research projects must conform to departmental format. To insure future accessibility and for record keeping purposes, a copy of the results must be deposited in a designated library.

Two years of work are usually necessary to complete degree requirements.

Students applying for admission to the Master of Fine Arts program should have completed an undergraduate degree program or equivalent in the area of specialization they wish to pursue at the graduate level. In addition, candidates are required to submit slides and/or a portfolio of their creative work, or to audition, prior to being accepted into the program.

Art.—The MFA degree with a major in art is designed for those who wish to prepare themselves as teachers of art in colleges and universities and for those who wish to attain a professional level proficiency in studio work or advanced work in art history. Specialization is offered in art history and art studio (ceramics, creative photography, drawing, painting, printmaking, sculpture). The MFA is generally accepted as the terminal degree in the studio area.

In addition to the general requirements stated above, course work must include ARH 5805—4 credits; ARH 6897 and 6898—4 credits each; a minimum of 32 credits in the major and a minimum of 9 credits in non-art electives. The remaining credits may be taken in advanced courses in the areas of specialization listed above or in general non-art electives.

Music.—The MFA degree with a major in music is designed primarily for those who wish to prepare for careers as teachers in colleges and universities, performers, music historians, music critics, church musicians, composers, and conductors. Recipients of the MFA degree will be prepared to continue doctoral study in the various areas of music listed above.

In addition to the general requirements stated above, registration in courses numbered MVS 6716—4 credits; MUH 6930 and MUL 6931—12 credits; and MUT 6930—8 credits is required.

Theatre.—The MFA degree with a major in theatre is designed primarily for those interested in production-oriented theatrical careers. Specialization is offered in the areas of directing and acting, design and technical theatre, costume, and dance and stage movement. The craft skills encompassed in the program are given subsequent application in public and studio productions.

In addition to the general requirements stated above, course work must include TPA 6215—4 credits; THE 6560—4 credits; a total of 32 credits of theatre practicum activities; and a total of 17 credits of advanced study in the student's area of specialization. The balance of the program, exclusive of nine credits in thesis research, is to be completed with elective theatre courses.

MASTER OF FOREST RESOURCES AND CONSERVATION

The Master of Forest Resources and Conservation program is designed for those students who wish additional professional preparation, rather than for those interested primarily in research. The basic requirements, including those for admission, supervisory committee, plan of study, and admission to candidacy, are the same as those indicated under *General Regulations* for master's degrees in this *Catalog*.

Work Required.—A minimum of 48 credits of course work is required, with at least 24 credits in graduate level courses. A minimum of 18 credits must be in a selected area of concentration in graduate level courses. A thesis is not required, but the student must submit a technical paper in an appropriate field. A comprehensive written qualifying examination, given by the supervisory committee, is required one quarter prior to graduation. A final oral examination, covering the candidate's entire field of study, is required.

MASTER OF HEALTH EDUCATION

The program leading to the degree of Master of Health Education is designed to meet the need for advanced preparation of health educators to serve in positions in the community and schools.

Work Required.—A minimum of 51 credits of course work is required, of which at least 50% must be graduate level courses in health education. Of the remaining 50% at least three health related courses or special skills of health education must be taken outside the Department of Health Education and Safety. Course approval must be obtained from the student's academic adviser.

Off-Campus Work.—The regulations governing the use of off-campus work are the same as those for the Master of Education degree.

Supervisory Committee.—A committee of the faculty of the Department of Health Education and Safety, with the Dean of the College, or a designated representative, serving as chairman and the Dean of the

Graduate School as an ex-officio member, will supervise the work of students registered in this program.

Admission to Candidacy.—Admission to this program is not a guarantee that the student will be admitted to candidacy for the degree. The student should apply for admission to candidacy no later than the last day of classes in the quarter prior to the quarter of anticipated graduation.

Final Examination.—The candidate must pass a final written or oral examination upon completion of course work. This written or oral examination will be confined largely to the student's major field of study.

MASTER OF HEALTH SCIENCE

The Master of Health Science degree is designed to meet the need for leadership personnel in allied health to serve a variety of functions required in established and emerging health care programs. The areas of concentration are occupational therapy and rehabilitation counseling.

In occupational therapy, a foundation program is required; i.e., evidence of completion of an accredited basic professional curriculum in occupational therapy. The work required is satisfactory completion of a minimum of 54 credits of academic course work. At least 50% of these credits must be at the 5000 level or above, including at least 32 credits in the major area. The concentration in occupational therapy requires appropriate practicum experiences and an internship. A thesis is not required but the candidate in occupational therapy must complete an approved departmental study or research project as a part of the degree requirements.

The concentration in rehabilitation counseling requires evidence of relevant work experience, education, and interest in the profession. The department requires completion of a minimum of 47 credits in the major area, including 10 credits for a one quarter internship and eight credits for clinical practice prior to the internship. The remaining credits for completing the 71 credit total are selected from courses which complement the student's academic background for rehabilitation counseling.

Additional requirements are listed under the *General Regulations* section for all master's degrees.

MASTER OF LAWS IN TAXATION (L.L.M. IN TAX.)

The instructional program leading to the degree Master of Laws in Taxation offers advanced instruction in taxation, with emphasis on federal taxation and particularly federal income taxation, for law graduates who plan to specialize in such matters in the practice of law.

Work Required.—Degree candidates must complete 36 credit hours in graduate level courses, 30 of which are in law college courses in taxation, including a research course in which the candidate is enrolled for an entire academic year.

MASTER OF SCIENCE IN NURSING AND MASTER OF NURSING

The College of Nursing offers the Master of Science in Nursing and Master of Nursing degrees with specialization in adult health, child health, family and community health, and women's and infants' nursing. In addition to the clinical specialty major, each student is expected to acquire the knowledge and skills essential to one of the functional areas of practice: clinical specialization, teaching in professional nursing programs, or nursing administration.

Work Required.—A minimum of 72 credit hours is required for graduation. Candidates for the Master of Science in Nursing degree must prepare and present theses acceptable to their supervisory committees and the Graduate School. Candidates for the Master of Nursing degree are required to complete a project.

Final Examination.—During the final quarter each student in the Master of Science in Nursing program must pass an oral examination in defense of the thesis. A final comprehensive oral or written examination, covering the student's entire program, must be passed by candidates for the Master of Nursing degree.

MASTER OF PHYSICAL EDUCATION

Work Required.—A minimum of 51 credits of course work is required, of which at least 50% must be graduate-level courses in physical education. Of the remaining 50%, at least three courses must be taken outside the Department of Professional Physical Education. Course approval must be obtained from the student's academic adviser.

Off-Campus Work.—The regulations governing the use of off-campus work are the same as those for the Master of Education degree.

Supervisory Committee.—A committee of the faculty of the College of Physical Education, Health, and Recreation, with the Dean of the College, or a designated representative, serving as chairperson, and the Dean of the Graduate School as an ex-officio member, will supervise the work of students registered in this program.

Admission to Candidacy.—Admission to this program is **not** a guarantee of admission to candidacy. Application should be made no later than the last day of classes in the term **prior** to that in which the student expects to graduate.

Final Examination.—The candidate must pass a final examination upon completion of the course work. This written or oral examination will be confined largely to the student's major field of study.

MASTER OF STATISTICS

The minimum credits required for the Master of Statistics degree are 54, including no less than 30 credits in the major field. Courses in the degree program, will be selected in consultation with the major adviser and approved by the student's supervisory committee. The work in the major field must be in courses approved for graduate major credit. At least half the 54 credits must be in graduate level courses. The student will be required to pass, as judged by the supervisory committee, a comprehensive written and oral examination covering the major.

REQUIREMENTS FOR THE DEGREE OF ENGINEER

For those engineers who need additional technical depth and diversification in their education beyond

the master's degree, the College of Engineering offers the degree of Engineer.

This degree requires a minimum of 45 credit hours of graduate work beyond the master's degree. It is not to be considered as a partial requirement toward the Ph.D. degree. The student's objective after the master's degree should be the Ph.D. or the Engineer degree.

Admission to the Program.—To be admitted to the program, students must have completed a master's degree in engineering at an accredited institution approved by the Graduate School, University of Florida, and apply for admission to the Graduate School of the University of Florida. The master's degree is regarded as the essential foundation for the degree of Engineer.

Course and Residence Requirements.—A total registration in an approved program of at least 45 quarter credit hours beyond the master's degree is required. This minimum requirement must be earned through the University of Florida. These credits may be completed in any graduate program administered by the College of Engineering. The last 45 quarter credit hours must be completed within five calendar years.

Supervisory Committee.—Each student admitted to the program will be advised by a supervisory committee consisting of at least three members of the graduate faculty. Two members are selected from the major department and at least one from a supporting department. In addition, every effort should be made to have a representative from industry as an external adviser for the student's program.

This committee will inform the student of all regulations pertaining to the degree program. The committee is nominated by the department chairperson, approved by the Dean of the College of Engineering, and appointed by the Dean of the Graduate School. The Dean of the Graduate School is an ex-officio member of all supervisory committees and should be notified in writing in advance of all committee meetings. If a thesis or report is a requirement in the plan of study, the committee will approve the proposed thesis or report and the plans for carrying it out. The thesis also must be submitted to the Graduate School. The committee will also conduct the final examination when the plan of study is completed.

Plan of Study.—Each plan of study is developed on an individual basis for each student. Thus, there are no specific requirements for the major or minor; each student is considered as a separate case. If the plan of study includes a thesis, the student may register for from 9 to 15 quarter credit hours of thesis research in a course numbered 6971.

Admission to Candidacy.—Application for admission to candidacy should be made no later than the last day of classes in the quarter prior to the quarter in which the student plans to receive the degree.

Thesis.—The thesis should represent performance at a level above that ordinarily associated with the master's degree. It should clearly be an original contribution; this may take the form of scientific research, a design project, or an industrial project approved by the supervisory committee. Work on the thesis may be conducted in an industrial or governmental laboratory under conditions stipulated by the supervisory committee.

Final Examination.—After the student has completed all work on the plan of study, the supervisory committee conducts a final comprehensive oral or written examination, which also involves a defense of the thesis if one is included in the program.

REQUIREMENTS FOR THE ED.S. AND ED.D.

The College of Education offers programs leading to the degrees Specialist in Education, Doctor of Education, and Doctor of Philosophy. These programs are available in five areas: administration and supervision, curriculum and instruction, foundations of education, counselor education, and special education. The Specialist in Education degree is awarded for a 2-year program of graduate study. The Doctor of Education degree requires writing a doctoral dissertation. Foreign languages are not required. The Doctor of Philosophy degree in the College of Education is described under *Requirements for the Ph.D.*

Programs leading to these degrees are administered through the individual departments in the College of Education. It is the responsibility of the department's chairperson to carry out the policies of the Graduate School and the graduate committee of the College of Education. More specific information about the various programs and departmental requirements may be obtained from the individual departments. General information or assistance is available through the Office of Student Services in Education, Room 134 Norman Hall.

Admission to the Ed.S., Ed.D., and Ph.D. programs is open only to persons who have met the following requirements:

1. Successfully completed 50 credits of professional course work in education. Applicants for admission to advanced degree programs in the College of Education who meet all the requirements except for successfully completing 50 credits of professional education courses may be given provisional admission and full admission when they have completed the required 50 credits.

2. Presented a record of successful professional experience, the appropriateness of which will be determined by the instructional department passing on the applicant's qualifications for admission. In some instances, departments may admit students with the understanding that further experience may be required before the student will be recommended for the degree.

Admission to advanced degree programs is based on the following criteria:

1. High scholastic average for previous graduate work (3.5 grade-point average or above, as computed at the University of Florida, will be considered evidence of good scholarship).

2. Satisfactory scores on the Aptitude Test of the Graduate Record Examination (GRE).

The judgment concerning admission of an individual student is made according to the above criteria by the major department.

SPECIALIST IN EDUCATION

Primary emphasis in an Ed.S. program is placed on the development of the competencies needed for a specific job. Programs are available in the various areas of concentration within the Departments of Educational Administration and Supervision, Foundations of Education, Counselor Education, and Special Education and the Division of Curriculum and Instruction. The Florida State Department of Education recognizes this degree for purposes of granting Rank IA certification.

To study for this degree, the student must apply and be admitted to the Graduate School of the University of Florida. The student must also apply and be admitted to candidacy for the degree no later than the term prior to that in which the degree is to be awarded. All work for the degree must be completed within seven years after admission to the Graduate School.

The Ed.S. degree is awarded at the completion of a planned program with a minimum of 100 credits beyond the bachelor's degree or a minimum of 50 credits beyond the master's degree. All credits accepted for the program must contribute to the unity and the stated objective of the total program. Students are examined (in no case earlier than six months prior to receipt of degree) on both a written and oral examination by a committee selected by the department chairperson. A thesis is not required; however, each program will include continuing attention to a research component relevant to the professional role for which the student is preparing.

Students who enter the program with an appropriate master's degree from another accredited institution must complete a minimum of 50 credits of post master's study to satisfy the following requirements.

1. 32 credits in graduate level courses.
2. At least 16 credits in graduate level professional education courses.
3. At least two quarters of full-time residence on campus in Gainesville.

Eighteen credits for appropriate courses offered off-campus by the University of Florida may be transferred to the program. Nine credits may be transferred from another institution of the State University System or from any institution offering a doctoral degree; however, credit transferred from another institution reduces proportionately the credit transferred from University of Florida off-campus courses.

Students who enter the program with a bachelor's degree only must, during their 100-credit program, satisfy these requirements in addition to the requirements of the Master of Education degree or its equivalent.

DOCTOR OF EDUCATION

A doctoral candidate is expected to achieve understanding of the broad field of education and competence in an area of specialization. Programs are available in the various areas of concentration within the Departments of Educational Administration and Supervision, Foundations of Education, Counselor Education, Special Education, and the Division of Curriculum and Instruction.

Admission to a program of work leading to the degree of Doctor of Education requires admission to the Graduate School.

All courses beyond the master's degree taken at another institution, to be applied toward the Doctor of Education degree, must be taken at an institution offering the doctoral degree and must be approved for graduate credit by the Graduate School of the University of Florida.

Minors.—Minor work or work in cognate fields is required. Minor work may be completed in any department, other than the major department, approved for master's or doctoral degree programs as listed in this *Catalog*. If one minor is selected, at least 24 credits of work therein will be required; if two minors are chosen, one must have at least 18 credits of course work, the other at least 8 credits.

Courses in physical education approved by the College of Physical Education, Health, and Recreation and the Graduate School as subject matter or content courses may be used in the cognate work or as a minor.

In lieu of a minor or minors, the candidate may present a suitable program of no fewer than 24 credits of cognate work in at least two or more departments. If two fields are included, there shall be no fewer than eight credits in either field. If three or more fields are included, the eight credit requirement for each field does not apply. This program must have the approval of the student's supervisory committee. The College of Education faculty will expect the candidate to be prepared to answer questions, at the time of the oral examination, in any of the areas chosen.

Admission to Candidacy.—Admission to candidacy for the degree of Doctor of Education requires successful completion of the qualifying examinations and approval of a dissertation topic. Recommendation to the Graduate School for admission to candidacy is based on the action of the supervisory committee. The State Department of Education recognizes this admission to candidacy for purposes of granting Rank 1A certification. Application for admission to candidacy should be made as soon as the qualifying examination has been passed and a dissertation topic has been approved by the student's supervisory committee.

Qualifying Examination.—The applicant is recommended for the qualifying examination by the supervisory committee after completion of sufficient course work.

The examination, administered by the student's major department, consists of (1) a general section; (2) a field of specialization section; (3) examination in the minor or minors, where involved; and (4) an oral examination conducted by the applicant's supervisory committee.

If the student fails the qualifying examination, a reexamination will not be given unless recommended for special reasons by the supervisory committee and approved by the Graduate School. At least one quarter of additional preparation is considered essential before reexamination.

Research Preparation Requirement.—EDF 7486 (Methods of Educational Research) or its equivalent, for which a basic course in statistics is a prerequisite, is a minimum requirement in all programs. Additional requirements vary with the department and with the student's plans for doctoral research.

For information relating to *Residence*, the *Supervisory Committee*, *Time Lapse*, the *Dissertation*, and the *Final Examination*, the student is referred to the material presented under the heading *Requirements for the Ph.D.* These statements are applicable to both degrees.

REQUIREMENTS FOR THE PH.D.

Doctoral study consists of the independent mastery of a field of knowledge and the successful pursuit of research. For this reason, doctoral students act, in large measure, on their own responsibility; consequently, doctoral programs are more flexible and varied than those leading to other graduate degrees. The Graduate Council does not specify what courses will

be required for the Ph.D. degree. The general requirement is that the program should be unified in relation to a clear objective and that it should have the considered approval of the student's entire supervisory committee.

COURSE REQUIREMENTS

The course requirements for doctoral degrees vary from field to field and from student to student. The student's supervisory committee has the responsibility for recommending individual courses of study for each doctoral student subject to the approval of the Dean of the Graduate School. A minimum of 135 credits beyond the bachelor's degree is required for the doctoral degree.

Major.—The student working for the Ph.D. must elect to do the major work in a department specifically approved for the offering of doctoral courses and the supervision of dissertations. These departments are listed under *Graduate Programs*.

Minor.—With the approval of the supervisory committee, the student may choose one or more minor fields. Minor work may be completed in any department, other than the major department, approved for master's or doctor's degree programs as listed in this *Catalog*.

If one minor is chosen, the representative of the minor department on the supervisory committee shall suggest from 18 to 36 credits as preparation for a qualifying examination. A part of this background may have been acquired in the master's program. If two minors are chosen, each must include at least 12 credits. Competence in the minor area may be demonstrated through a written examination conducted by the minor department or through the oral qualifying examination.

Course work in the minor at the doctoral level need not be restricted to the courses of one department, provided that the minor has a clearly stated objective and that the combination of courses representing the minor shall be approved by the Graduate School. This procedure is not required for a departmental minor.

SUPERVISORY COMMITTEE

Supervisory committees are nominated by the department chairperson, approved by the dean of the college concerned, and appointed by the Dean of the Graduate School. The committee should be appointed as soon as possible after the student has begun doctoral work, and in general no later than the end of the third quarter of equivalent full-time study. The Dean of the Graduate School is an ex-officio member of all supervisory committees and should be notified in writing well in advance of all examinations conducted by such committees.

Duties and Responsibilities.—Duties of the supervisory committee follow:

1. To inform the student of all regulations governing the degree sought. **It should be noted, however, that this does not absolve the student from the responsibility of informing himself concerning these regulations.** *(See Student Responsibility.)*
2. To meet immediately after appointment to pass on the qualifications of the student and to discuss and approve a program of study.
3. To meet to discuss and approve the proposed dissertation project and the plans for carrying it out.
4. To conduct the qualifying examination or, in those cases where the examination is administered by the department, to take part in it. In either event, no fewer than five faculty members shall be present for the oral portion of the examination.
5. To meet when the work on the dissertation is at least one-half completed to review procedure, progress, and expected results and to make suggestions for completion.
6. To meet when the dissertation is completed and conduct the final oral examination to assure that the dissertation is a piece of original research and a contribution to knowledge. No fewer than five faculty members shall be present for this examination, but only the members of the official supervisory committee are required to sign the dissertation. The dissertation must be approved unanimously by the official supervisory committee.

Membership.—The supervisory committee for a candidate for the doctoral degree shall consist of no fewer than three members selected from the graduate faculty. At least two members will be from the college or department recommending the degree, and at least one member will be drawn from a different educational discipline. The chairperson and at least one additional member of the committee will be members of the Doctoral Research Faculty of the University of Florida.

If a minor is chosen, the supervisory committee will include at least one person selected from the graduate faculty from outside the discipline of the major for the purpose of representing the student's minor. In the event that the student elects more than one minor, each minor area may, at the discretion of the departments concerned, be represented on the supervisory committee.

When a minor is not designated, the supervisory committee will include at least one member of the graduate faculty from outside the discipline of the major. The Graduate Council desires each supervisory committee to function as a university committee, as contrasted with a departmental committee, in order to bring university-wide standards to bear upon the various doctoral degrees.

In unusual cases the doctoral research may require the guidance of a specialist from an area of study other than that of the chairperson of the supervisory committee. In such cases the department head may recommend appointment of a chairperson and a cochairperson, with the latter being a member of the graduate faculty but not necessarily the Doctoral Research Faculty. A cochairperson may also be appointed to serve during a planned absence of the chairperson; in this case both the chairperson and the cochairperson must be appointed to the Doctoral Research Faculty.

LANGUAGE REQUIREMENT

Any foreign language requirement, or a substitute therefor, for the Ph.D. is established by the major department with approval of the college. The student should check with the graduate coordinator of the appropriate department for specific information. The foreign language departments offer special classes for graduate students who are beginning the study of a language. See the current *Schedule of Courses* for the languages in which this assistance is available.

The ability to use the English language correctly and effectively, as judged by the supervisory committee, is required of all candidates.

RESIDENCE

Candidates for the doctoral degree must satisfy the minimum residence requirements by completing beyond the master's degree (1) 45 quarter hours in one calendar year, or (2) 52 quarter hours in no more than six quarters within a period of two calendar years on the Gainesville campus of the University of Florida. Half-time graduate assistants fulfill this requirement if registered for eight hours in each of six quarters during the two year period.

Candidates in the College of Agriculture may do their research at certain branch stations of the University of Florida Agricultural Experiment Station where adequate staff and facilities are available.

QUALIFYING EXAMINATION

The qualifying examination, which is required of all candidates for the degree of Doctor of Philosophy, may be taken during the third term of the second year of graduate study. The examination, conducted by the supervisory committee, with the aid of the major and minor departments, is both written and oral and covers the major and minor subjects. At least five faculty members must be present at the oral portion. The supervisory committee has the responsibility at this time of deciding whether the student is qualified to continue work toward the Ph.D. degree.

If a student fails the qualifying examination, the Graduate School must be notified. A reexamination may be requested, but it must be recommended by the supervisory committee and approved by the Graduate School. At least one quarter of additional preparation is considered essential before reexamination.

An announcement of the scheduling of each student's qualifying examination must be submitted in writing to the Dean of the Graduate School. If the student does not file for admission to candidacy immediately after the qualifying examination, a written report of the result of the examination must be filed with the Graduate School Office.

Time Lapse.—Between the qualifying examination and the date of the degree there must be a minimum of two quarters if the candidate is in full-time residence, or three quarters if the candidate is on less than a full-time basis. The quarter in which the qualifying examination is passed is counted, provided that the examination occurs before the midpoint of the term.

ADMISSION TO CANDIDACY

A graduate student does not become an actual candidate for the Ph.D. degree until granted formal admission to candidacy. Such admission requires the approval of the student's supervisory committee, the department chairperson, the college dean, and the Dean of the Graduate School. The approval must be based on (1) the academic record of the student, (2) the opinion of the supervisory committee concerning overall fitness for candidacy, (3) an approved dissertation topic, and (4) a qualifying examination as described above. **Application for admission to candidacy should be made as soon as the qualifying examination has been passed and a dissertation topic has been approved by the student's supervisory committee.**

DISSERTATION

Every candidate for a doctoral degree is required to prepare and present a dissertation that shows independent investigation and is acceptable in form and content to the supervisory committee and to the Graduate School. Since all doctoral dissertations will be published by microfilm, it is necessary that the work be of publishable quality and that it be in a form suitable for publication.

The original copy of the dissertation must be presented to the Dean of the Graduate School on or before the date specified in the *University Calendar.* It must contain an abstract and be accompanied by four unpaged separate copies of the abstract, a letter of transmittal from the supervisory chairperson, and all doctoral forms. After corrections have been made, and no later than the specified formal submission date, the fully signed copy of the dissertation, together with the signed Final Examination Report, should be returned to the Graduate School. The original copy of the dissertation is sent by the Graduate School to the Library for microfilming and hardbinding. A second signed copy, reproduced on required thesis paper, should be given to the office of the college dean or the graduate coordinator for subsequent delivery to the Library for hardbinding. The supervisory chairperson and the candidate will each need a copy and, if required, another should also be provided for the departmental library.

Publication of Dissertation.—All candidates for the Ph.D. and Ed.D. degrees are required to pay the sum of $25 to Student Accounts, the Hub, for microfilming their dissertations, and to sign an agreement authorizing publication by microfilm.

Copyright.—The candidate may choose to copyright the microfilmed dissertation for a charge of $20 payable by a certified or cashier's check or money order to University Microfilms attached to the signed microfilm agreement form. To assure receipt of the valuable Copyright Registration Certificate, candidates must give permanent addresses through which they can always be reached.

FINAL EXAMINATION

After submission of the dissertation and the completion of all other prescribed work for the degree, but in no case earlier than six months before the conferring of the degree, the candidate will be given a final examination, oral or written or both, by the supervisory committee. An announcement of the scheduled examination must be sent to the Dean of the Graduate School. At least five faculty members must be present at the oral portion of this examination. At the time of the defense all committee members should sign the signature pages and all committee and attending faculty members should sign the Final Examination Report. These may be retained by the supervisory chairman until acceptable completion of corrections.

Satisfactory performance on this examination and adherence to all Graduate School regulations outlined above complete the requirements for the degree.

Time Limitation.—All work for the doctorate must be completed within five calendar years after the qualifying examination, or this examination must be repeated.

CERTIFICATION

Doctoral candidates who have completed all requirements for the degree, including satisfactory defense and final acceptance of the dissertation, may request certification to that effect prior to receipt of the degree. Certification Request Forms, available in the Graduate School Editorial Office, should be filled out by the candidate, signed by the college dean, and returned to the Graduate School for verification and processing.

EXPENSES

APPLICATION FEE

Each application for admission to the University must be accompanied by an application fee of $15. Application fees are nonrefundable. Further instructions will be found in the *Admissions* section of this *Catalog*.

CLASSIFICATION OF STUDENTS—FLORIDA OR NON-FLORIDA

(Section 6C—7.05, Florida Administrative Code)

(1) For the purpose of assessing registration and tuition fees, a student shall be classified as a "Florida" or "non-Florida" student.

(a) A "Florida student" is a person who has domicile in and who shall have resided in the state of Florida for at least twelve (12) consecutive months immediately preceding the first day of classes of the academic term in which the student enrolls. In determining residency, the university may require evidence such as voter registration, driver's license, automobile registration, location of bank account, rent receipts or any other relevant materials as evidence that the applicant has maintained continuous residency. Physical presence for the entire twelve-month period need not be required so long as the conduct of the student, taken in total, manifests an intention to make Florida his or her permanent dwelling place. If such a student is a minor, it shall mean that the parent or parents, or legal guardian of the student shall have domicile in and have resided in the state of Florida for the period stated above. "Florida student" classification shall also be construed to include students who held an Immigration and Naturalization Form 1-151, Resident Alien Registration Receipt Card, or Cuban Nationals or Vietnamese Refugees who are considered as Resident Aliens, provided such students meet the residency requirement stated above and comply with subsection (2) below. The burden of establishing facts which justify classification of a student as a resident and domiciliary entitled to "Florida student" registration rates is on the applicant for such classification.

(b) In applying this policy:

1. "Student" shall mean a person admitted to the, or a person allowed to register at the institution on a space available basis.

2. "Minor" shall mean a person who has not attained the age of 18 years, and whose disabilities of minority have not been removed by reason of marriage or by a court of competent jurisdiction.

3. "Domicile" for fee paying purposes shall denote a person's true, fixed, and permanent home and place of habitation. It is the place where the applicant lives and remains and to which he expects to return when he leaves, without intent to establish domicile elsewhere.

4. "Parent" shall mean a minor's father or mother, or if one parent has custody of a minor applicant, it is the parent having court assigned financial responsibility for the education of the student; or if there is a court appointed guardian or legal custodian of the minor applicant, it shall mean the guardian or legal custodian.

5. The term "dependent student," as used in this rule is the same as a dependent as defined in sections 151(e)(1)(2)(3) and (4) of the Internal Revenue Code of 1954. A copy of these provisions in the Internal Revenue Code of 1954 is incorporated in this rule by reference.

6. A "non-Florida" student is a person not meeting the requirements of subsection (a) above.

(2) In all applications for admission or registration at the institution on a space available basis, a Florida applicant, or if a minor, the parent or legal guardian of the minor applicant, shall make and file with such application a written statement, under oath, that the applicant is a bonafide citizen, resident, and domiciliary of the state of Florida, entitled as such to classification as a "Florida student" under the terms and conditions prescribed for citizens, residents, and domiciliaries of the state of Florida. All claims to "Florida student" classification must be supported by evidence as stated in 6C-7.05(1) if requested by the registering authority.

(3) A "non-Florida student" or, if a minor, his parent or guardian, after having been a resident and domiciliary of Florida for twelve (12) consecutive months, may apply for and be granted reclassification prior to the first day of classes of any subsequent term, provided, however, that those students who are non-resident aliens or who are in the United States on a non-immigration visa will not be entitled to reclassification. An application for reclassification as a "Florida student" shall comply with provisions of subsection (2) above. An applicant who has been classified as a "non-Florida" student at time of original enrollment shall furnish evidence as stated in 6C-7.05(1) to the satisfaction of the registering authority that the applicant has maintained continuous residency in the state for the twelve months required to establish residence for tuition purposes. In the absence of such evidence, the applicant shall not be reclassified as a "Florida student." In addition, the application for reclassification must be accompanied by a certified copy of a declaration of intent to establish legal domicile in the state, which intent must have been filed with the Clerk of the Circuit Court, as provided by Section 222.17, Florida Statutes. If the request for reclassification and the necessary documentation is not received by the registrar prior to the last day of registration for the term in which the student intends to be reclassified, the student will not be reclassified for that term.

(4) Unless evidence to the contrary appears, it shall be presumed by the registering authority of the institution at which a student is registering that:

(a) The spouse of any person who is classified or is eligible for classification as a "Florida student" is likewise entitled to classification as a "Florida student." This provision will not apply in the case of students who are non-resident aliens or who are in the United States on a non-immigration visa.

(b) If an applicant's eligibility for classification as a "Florida student" is based on the residency of the spouse, the spouse shall make and file with the application a written statement under oath, that said person is the spouse of the applicant and a bonafide citizen, resident and domiciliary of the state of Florida, entitled as such to classification as a "Florida student."

(c) No person over the age of 18 years shall be deemed to have gained residence while attending any educational institution in this state as a full-time student, as such status is defined by the Board of Regents, in the absence of a clear demonstration that he has established domicile and residency in the state, as provided under subsection (3) above.

(d) Any "Florida student" who remains in the state, after his parent previously domiciled in Florida or stationed in Florida on military orders removes from this state, shall be entitled to remain classified as a "Florida student" so long as his or her attendance at a school or schools in Florida shall be deemed "continuous." However, such student claiming continuous attendance must have been enrolled at a school, college or university for a normal academic year in each calendar year, or the appropriate portion or portions thereof, from the beginning of the period for which continuous attendance is claimed. Such a student need not attend summer sessions or other such intersession beyond the normal academic year in order to render his attendance "continuous."

(5) Appeal from a determination denying Florida student status to any applicant therefor may be initiated after appropriate administrative remedies are exhausted by the filing of a petition for review pursuant to Section 120.68 F.S. in the District Court of Appeal in the appellate district in which the institution maintains its headquarters or where a party resides.

(6) Any student granted status as a "Florida student," which status is based on a sworn statement which is false shall, upon determination of such falsity, be subject to such disciplinary sanctions as may be imposed by the president of the university.

(7) Special Categories—The following categories shall be treated as Florida residents for tuition purposes if adequate documentation is provided:

(a) A member of the Armed Services of the United States who is stationed in Florida on active duty pursuant to military orders, the spouse and dependent students.

(b) A veteran of the Armed Forces of the United States of America with twenty (20) or more years of active military service, including the spouse and dependent students of such veteran's immediate family, provided that the veteran is in Florida at time of retirement or moves to Florida within one year following retirement and files a declaration of Florida domicile.

(c) Full-time elementary, secondary, and community college faculty members under current teaching contracts in the state of Florida and their spouses and dependent students.

(d) Full-time faculty, administrative and professional and career service employees of the University System and their spouses and dependent students.

(e) A student certified by his respective state for participation in the Academic Common Market Program of the Southern Regional Education Board who is enrolled in a program approved by the Florida Board of Regents.

(f) Florida domiciliaries living in the Panama Canal Zone who have not established domicile elsewhere, including the spouse and dependent students.

(g) Florida residents who had their residency in Florida interrupted by service in the U. S. armed forces, the Peace Corps or other similar volunteer organizations fostered by the United States government shall be deemed to have had residency in Florida during times of service in the aforementioned organizations.

(8) Reciprocal Agreements. The Board of Regents may enter into agreements with appropriate agencies and institutions of higher education in other states and foreign countries providing for the reciprocal exchange of students enrolled and prospective in higher educational institutions to facilitate utilization of public higher educational institutions in this State and other states or countries. Such agreements may include provisions for waiver or reduction of nonresident tuition for designated categories of students and may include contractual payments to such other state or country, subject to the availability of appropriations. Such agreements shall have as their purpose the mutual improvement of educational advantages for residents of this State and such other states or countries with whom agreements may be made.

To establish Florida residence a student applying for admission should complete the residence affidavit on the application form.

To change status from non-Florida a student must present to the Registrar's Office a copy of the Declaration of Intent and the completed Residence Affidavit Form. To claim the military exception the student must furnish the Registrar's Office a copy of the military orders showing assignment to Florida. A public school official must submit a written statement from his or her superior as to his or her public school status. A University employee must submit a statement from his or her employer as to his or her employment status.

REGISTRATION AND INSTRUCTIONAL FEES

The *University Calendar* appearing at the front of this *Catalog* sets forth the beginning and ending dates of each quarter.

The following fees and charges are proposed at this time. However, since the *Catalog* must be published

considerably in advance of its effective date, it is not always possible to anticipate changes, and the fee schedule may be revised. Every effort will be made to publicize changes for any quarter in advance of the registration date for that quarter.

Fees are payable on the dates listed in the *Calendar* or the date given on the statement sent those participating in advance registration. Payment of fees is an integral part of the registration process. Registration (including payment of fees) must be completed on or before the proper due date. Mail payments must be received at Student Accounts, the Hub, by that date. All payments, or properly executed authorization for payment in cases where fees are to be paid by a previously approved loan, scholarship, etc., whether for full- or part-time students, received after the due date are subject to a $25 late fee. The fees charged are based on the classification of a student as Florida or non-Florida, full-time or part-time. Unless otherwise noted, the fees for each quarter include fees for matriculation, student health services, student activities, and a general building fee.

Fees are assessed graduate students as follows:

	Florida Students	Non-Florida Students
Courses numbered 3000-4999. *Per credit:*	$16.50	$51.50
Courses open only for graduate credit (5000- and above). *Per credit:*	$22.00	$62.00
Thesis and dissertation courses (6971 and 7980). *Per credit:*	$24 00	$64.00

Any graduate student who is utilizing University facilities and/or faculty time must register for an appropriate load, in no case less than three credits.

SPECIAL FEES

Audit Fee.—Fees for audited courses are the same as those listed above for Florida students. The audit fee is the same for Florida and non-Florida students.

Student Health Fee.—Students registered for nine or more credits per quarter are required to pay a $11 Student Health Fee. This fee is optional for students registered for eight credits or less.

Late Registration Fee.—A fee of $25 will be assessed for failure to initiate registration during the registration period or failure to pay fees within the time period specified.

Reinstatement Fee—Cancellation and Reinstatement.—(1) The University will cancel the registration of a student whose fee account for enrolled instructional courses is in arrears beyond the close of business on the twenty-eighth day after the opening day of classes. A student whose registration is cancelled is not entitled to a refund beyond the circumstances covered under the refund policy. (2) Reinstatement will require approval of the University, payment of all delinquent liabilities and payment of a reinstatement fee of $25 in addition to the late registration fee.

Graduate Record Examination.—The Aptitude Test of the Graduate Record Examination is required for admission to the Graduate School. A fee of $14 covers the cost of this examination. Students who take one of the Advanced Tests of the GRE in combination with the Aptitude Tests pay a fee of $28. These fees are payable to the Educational Testing Service, Princeton, New Jersey 08540.

Graduate School Foreign Language Test.—A fee of $13 is assessed to cover the cost of this examination. Administrative arrangements to register for this examination and the payment of fees must be made through the Office of Instructional Resources, 1012 GPA.

Library Permanent Binding Fee.—Each candidate for a degree with a thesis or dissertation must pay a fee of $13 for the permanent hardbinding of the two copies of the thesis or dissertation deposited in the University Libraries. This fee is payable at Student Accounts, the Hub. A copy of the receipt for this fee must be presented at the Graduate School Editorial Office.

Microfilm Fee.—A fee of $25 is charged for the publication of the doctoral dissertation by microfilm. This fee is payable at Student Accounts, the Hub. A copy of the receipt for this fee must be presented at the Graduate School Editorial Office.

REFUND OF FEES

Fees will be refunded in full for:

1. Credit hours dropped during the drop/add period.
2. Courses cancelled by the University.

With the exception of amounts required for collection under bond and trust obligations, fees may be refunded in instances of:

1. Involuntary call to active duty.
2. Death of a student.
3. Illness of the student of such duration or severity, as confirmed by a physician, that completion of the quarter is precluded, or
4. Exceptional circumstances, upon approval of the University President.

Refunds may be requested at Student Accounts, 114 Hub. Proper documentation must be presented when a refund is requested. A waiting period for processing may be required. Refunds are not applied automatically against current or subsequent fee liabilities.

PAST DUE STUDENT ACCOUNTS

All student accounts are due and payable at Student Accounts, the Hub, when charges are incurred.

Delinquent accounts will be considered sufficient cause for cancellation of registration, as University regulations prohibit registration, graduation, granting of credit, or release of transcript for any student whose account with the University is delinquent.

TRAFFIC AND SAFETY REGULATIONS

All students must register their automobiles or motorcycles at the University Traffic and Parking Department during their first registration period at the University. There is a fee for registration and schedule of fines for on-campus vehicle violations. A complete set of rules governing traffic, parking, and vehicle registration may be secured at the Traffic and Parking Office, Room 108D, Johnson Hall. Each student should become familiar with these regulations upon registering at the University.

HOUSING

For Married Graduate Students.—Apartment accommodations on the University campus are available for some married graduate students. Applications should be made as soon as possible.

For Single Graduate Students.—Two modern air conditioned residence halls, YULEE Scholarship Hall, and one apartment village are open to graduate and upper-division students. Housing agreements for all single students are for the agreement year of three quarters (September to June) if enrolled. A separate agreement is available for summer quarter residents.

APPLICATIONS

Each student must make personal arrangements for housing, either by applying to the Office of the Director of Housing for assignment to University housing facilities or by obtaining accommodations in private housing. All inquiries concerning University housing facilities should be addressed to the Director of Housing, University of Florida. Inquiries about private housing accommodations should be addressed to the Off-Campus Housing Office, Division of Housing, University of Florida.

An application for on-campus housing may be filed at any time after a student is admitted to the University. Students are urged to apply as early as possible because of the housing demand.

Graduate students living in University housing are required to qualify as full-time students as defined by the University, and they must continue to make normal progress toward a degree as determined by their supervisory committees.

Roommate requests are honored whenever possible, provided the individuals wishing to room together submit their applications at the same time, clearly indicate on their respective applications their desire to room together, and are within similar academic classifications. Any student interested in a room assignment with an international student should indicate this preference on the application.

RESIDENCE HALLS FOR SINGLE STUDENTS

Some variety in types of accommodations is provided by the University. The double room for two students is the most common type. Several of the larger rooms or suites are designated as triple rooms. Single rooms are available in limited number. Suites for two students consist of two connected rooms—a bedroom and a study room. Suites for four, which are available in Beaty Towers, include two bedrooms, a private bath, and a study-kitchenette. Single assignments to regular apartments are available in other housing accommodations.

Beaty Towers are completely carpeted and air-conditioned. Yulee Scholarship Hall, where student rooms are not air-conditioned, has centrally located air-conditioned study and recreation rooms. For information on rental rates, contact the Director of Housing, University of Florida.

COOPERATIVE LIVING ARRANGEMENTS

There are five different cooperative living groups at the University of Florida. Three of these groups are located on campus, and the other two are located off campus.

Among the qualifications for membership are scholastic ability and reference of good character. These cooperative living groups are specifically operated by and for students with limited financial means for attending the University.

Inquiries pertaining to cooperative living on campus are made to the Director of Housing, University of Florida. The cooperative living organizations on campus currently are the Reid Hall Co-op, the North Hall Co-op, and the Buckman Co-op. Off-campus co-ops are the Collegiate Living Organization (coed), 117 N.W. 15th Street, and Georgia Seagle Hall (men), 1002 West University Avenue. Inquiries should be made to these addresses.

FAMILY STUDENT HOUSING

The University operates five apartment villages for eligible students. To be eligible to apply for and occupy apartment housing on campus, the following are necessary:

A married student or student parent without spouse who has legal care of minor children must meet the requirements for admission to the University of Florida, qualify as a full-time student as defined by the University, and continue to make normal progress toward a degree as determined by the head of the student's college or school.

The married student must be a part of a family unit, defined as: (1) husband and wife with or without one or more children; or (2) divorced or widowed person who has legal care of minor children.

Residents in all villages must furnish their own linens, dishes, rugs, curtains, or other similar items. Utilities are an extra expense and are billed with the rent.

Corry Memorial Village (216 units), of modern brick, concrete and wood construction, contains almost an equal number of one and two bedroom apartments, with a few three-bedroom units. These apartments are carpeted and furnished with basic equipment, as available, in the living room, kitchen, dining area, and one bedroom.

Diamond Memorial Village consists of 208 apartments similar in construction, furnishings, and equipment to those in Corry Village. Special features include a community building with air-conditioned study-meeting room, and a study cubicle in each two-bedroom apartment.

Tanglewood Manor Apartments, located approximately 1¼ miles south of the central campus, consists of 208 furnished and unfurnished efficiency, one- and two-bedroom, and two-bedroom townhouse units. All units are carpeted, centrally heated and air-conditioned. All units have disposals and two-bedroom units have dishwashers. All one- and two-bedroom units have 1½ baths. Community facilities include a large recreation hall, laundry facilities, and two swimming pools.

University Village South and Maguire Village consist of 348 centrally heated and air-conditioned one- and two-bedroom apartments. Community facilities include a laundry and a community room. Individual apartments are not furnished but are carpeted. The kitchens are equipped with stove and refrigerator.

For Maguire Village Only, the married, widowed, or divorced student must be part of a family with a combined gross annual income (including grants-in-aid, VA benefits, scholarships, fellowships and grants) which does not exceed, during the period of occupancy, the following maximum income limitations: two persons, $10,850; three persons, $12,200; four persons, $13,600; five persons, $14,450; and six persons, $15,300.

OFF CAMPUS HOUSING

The Off Campus Housing Office is a listing and referral agency for rental housing of all types. It is not an enforcement agency. It does not make rental reservations.

The purpose of the Off-Campus Housing Office is to assist University of Florida students, faculty, and staff in obtaining adequate off campus housing accommodations.

Persons who desire to use off campus housing services should request by mail or pick up in person at the Off Campus Office an off campus housing packet.

This packet contains a list of major apartment housing developments in the Gainesville area with handy zone map locations. Also in the packet is an information brochure on rental leases, deposits, rates, and insurances; a city bus route map and schedule; and utility application and hook-up forms. The Off Campus Office also maintains updated vacancy information on shares (roommate wanted), mobile homes, rental houses, rooms, and other rental listings for reference during housing business hours, Monday-Friday, 8-12 and 12:30-4:30. At other times, lighted listing boards are available outside the north entrances of the Housing Office.

FINANCIAL AID

Qualified graduate students in every department are eligible for a number of fellowships, assistantships, and other awards. In general, such awards are available to students pursuing either a master's or a doctoral degree. Unless otherwise specified, all applications for financial support should be made to the appropriate department head, University of Florida, by February 15 of each year.

Fellows and graduate assistants must pay the appropriate Florida or non-Florida tuition. Fellows and trainees are expected to devote full time to their studies and their stipend is "excludable from income for tax purposes." Graduate assistants who have part-time teaching or research duties should register for appropriately reduced study loads. Income received from their services is subject to withholding tax.

Graduate students with an assistantship, fellowship, or traineeship must not accept other employment. Required registration will be in accordance with the following schedule.

	Minimum Credit Registration	Maximum Credit Registration
Students not on appointments	12	20
Fellows and Trainees	12	20
1/4-time Assistants	12	17
1/3-time Assistants	10	17
1/2-time Assistants	8	17
3/4-time Assistants	6	14
Full-time Assistants	3	6

UNIVERSITY-WIDE AWARDS

Graduate Council Fellowships are available annually to academically superior students. These awards provide stipends ranging from $1000 to $6000 for nine months. **Special fellowships and scholarships** are available for minority and economically disadvantaged students and for women pursuing nontraditional careers. These awards require no service and provide full academic residence. All fellows must pay the appropriate Florida or non-Florida tuition unless a non-Florida student is awarded a tuition waiver.

Non-Florida Tuition Waivers may be available for non-Florida students who hold assistantships of one-third time or more.

One-Fourth-Time Assistantships provide a minimum stipend of $2,700 for nine months. Assigned duties in teaching or research amount to 10 hours a week.

One-Third-Time Assistantships provide a minimum stipend of $3,600 for nine months. Assigned duties in teaching or research amount to 13.3 hours a week.

One-Half-Time Assistantships provide a minimum stipend of $5,400 for nine months. Assigned duties amount to 20 hours a week.

Stipend rates (above minimum) paid for graduate assistantships are determined by individual departments.

Interested students should inquire at their department offices concerning the availability of assistantships and the procedure for making application. Prospective students should write directly to their major departments as well as to the Admissions Office. *Early inquiry is essential in order to be assured of meeting application deadlines.* Appointments are made on the recommendation of the department chairperson, subject to admission to the Graduate School and to the approval of the Dean of the Graduate School. Clear evidence of superior ability and promise is required. Reappointment to assistantships requires evidence of continuation of good scholarship.

TITLE VI—FOREIGN LANGUAGE AND AREA STUDIES FELLOWSHIPS

Title VI fellowships are available to graduate students, whose academic programs are either Latin America or Africa oriented. Applicants must be U.S. citizens or permanent residents, and must be registered for a full-time course load including a language relevant to the area of their choice, specifically, Spanish, Portuguese, or Aymara for recipients through the Center for Latin American Studies; Shona, Swahili, or Yoruba for recipients through the Center for African Studies.

Applicants may choose to major in any discipline or department where a Latin American or African emphasis is possible. Remuneration will consist of a $2,925 stipend for the academic year plus payment of all tuition and fees.

For further information, please contact the Director of either the Center for Latin American Studies (319 Grinter Hall), or the Center for African Studies (470 Grinter Hall), University of Florida.

NDEA-RELATED FULBRIGHT-HAYS GRADUATE FELLOWSHIPS FOR STUDY ABROAD

The purpose of this program is to enable graduate students who plan to teach in U.S. institutions of higher education to undertake non-Western language and area study and research abroad.

In general, fellows will be expected to study in the world area of their academic interests during their periods abroad, and fellows following a full-time program of formal study will normally be expected to

carry on their studies in a single country. In certain cases, however, approval may be given for dissertation research which would involve (a) visits to several countries, or (b) study outside the geographic area involved if it is demonstrated that specialized or superior research facilities exist elsewhere.

Stipends will be individually computed on the basis of the cost of living in the foreign country. The award will also cover travel expenses, fees for tuition which the fellow may need to carry out the approved program, and an allowance to help meet the cost of research and incidental expenses.

AGRICULTURE

H. Harold Hume Fellowship of the Florida Federation of Garden Clubs.—This fellowship, established by the Florida Federation of Garden Clubs, has for its object the investigation of special problems of ornamental horticulture in Florida. The work is under the direction of the Department of Ornamental Horticulture within the program of Horticultural Science. The fellowship carries a stipend of $2,700 annually.

EDUCATION

Many graduate students in education receive financial aid through assistantships and traineeships made available by federal and foundation grants for research and special programs. The number and nature of these awards vary with each academic year and during the year. Qualified students interested in financial support should maintain contact with the chairperson of the major department.

The Bingham Environmental Education Foundation grants a $300 award annually for a graduate student interested in environmental science or education. Contact Dr. Art Lewis for additional information.

ENGINEERING

Financial aid to graduate students in engineering is available through between 250 and 300 research and teaching assistantships requiring one-third- to one-half-time work loads with stipends of $377 per month and up. Information regarding application for these positions may be obtained from the graduate coordinator of the department of interest or from the Office of the Dean, College of Engineering.

Florida Steel Fabricators and Florida Rock Industries each provide $5,000 for a one year fellowship for civil engineering students pursuing a Master of Engineering degree.

LAW (TAXATION)

Limited financial aid is available. For information contact the Graduate Tax Office, College of Law, Holland Law Center.

MEDICINE

Predoctoral fellowships and part-time teaching and research assistantships are available for graduate students in the various basic medical science departments participating in the Ph.D. program. In addition some clinical and basic science departments offer postdoctoral fellowships to selected recent recipients of the M.D. or Ph.D. degree who wish extensive research experience in these disciplines. For information write the Assistant Dean for Graduate Education, College of Medicine, J. Hillis Miller Health Center.

NURSING

Limited financial aid is available. For information contact the Graduate Coordinator, College of Nursing, J. Hillis Miller Health Center.

PHARMACY

American Foundation for Pharmaceutical Education Fellowships.—A number of graduate fellowships are offered by the American Foundation for Pharmaceutical Education, which carry stipends of $4,200 per year, $350 per month. Holders of these fellowships may pursue graduate work at the University of Florida. Applications should be made to the Foundation, Rodburn Plaza Building, 14-25 Plaza Road, Fair Lawn, New Jersey 07410.

PSYCHOLOGY

Financial support is available to assist students to pursue graduate work leading to the doctor's degree. In addition to University-wide awards, current financial assistance includes U.S. Public Health Traineeships, Graduate Teaching and Research Assistantships, and the Center for Neurobiological Sciences Fellowships. For information write the Stipend Committee, Department of Psychology.

SPEECH

The Department of Speech administers a number of traineeships, fellowships, and assistantships from such sources as the National Institutes of Health, the U.S. Office of Education, and the University of Florida.

Additional information may be obtained from the Department of Speech.

LOANS

Long-term loans are available to graduate students from four sources: Federally Insured Loans, University of Florida Institutional Loans, National Direct Student Loans and loans awarded by the student's college or department. All programs are long-term low interest loans that need not be repaid while the student is enrolled full-time (or approved for fewer hours).

Loan maximums range from $1,000 to $5,000 per academic year, repayable after termination of enrollment, at interest rates varying from 3 to 7% annually. The actual amount of each National Direct Loan or institutional loan award is based on financial need as determined by the information provided by the student or the College Scholarship Service Financial Aid Form (FAF). Application for all loans **except** the Federally Insured loan should be made to the Office for Student Financial Affairs, 111 Anderson Hall, between December 1 and March 1 for the following academic year. Applications received after this date will be considered for aid if sufficient funds remain after those applications which arrived by the March 1 deadline have been processed. Applications for the

FIL are accepted year-around; however, lender deadlines vary.

Determination of financial need is not required for the Federally Insured Loan, but the student will need to obtain a lender (bank, savings & loan, credit union, etc.) who participates in the program. Applications may be obtained by coming by or writing the Office for Student Financial Affairs.

Students interested in applying for a college-department controlled loan should consult their college for eligibility requirements and application procedures.

PART-TIME EMPLOYMENT

Employment through the Federal College Work-Study Program is available to graduate students on a part-time basis. Every effort is made to refer applicants to positions that will complement their educational goals. Part-time employment under the College Work Study Program is awarded to applicants who apply using the general application from December 1 to March 1, for the following academic year. Applications for part-time employment under the Federal College Work Study Program are available in 111 Anderson Hall during the application period mentioned above. Applications for the State funded OPS (Other Personnel Services) program are available from Student Employment in 111 Anderson Hall. Approximately 2000 positions are staffed through the OPS program on campus.

NEXUS SYSTEM

The Office for Student Financial Affairs has prepared a series of tapes explaining the procedures for applying for financial aid in addition to explaining the individual programs. To use this system, students should call 392-1683 and ask for any or all of the following tapes: 402A—Applying for Financial Aid, 402B—Loans, 402C—Federally Insured Loans, 402D—Financial Aid for the Graduate Student, 402E—Student Budgets, 402F—Part-Time Employment, 402G—Grants, or 402H—Scholarships.

SPECIAL FACILITIES AND PROGRAMS

RESEARCH AND TEACHING FACILITIES

ART GALLERIES

The University Gallery is an integral part of the Architecture and Fine Arts complex. The Gallery is located on the campus facing S.W. 13th Street (U.S. 441). An atrium and reflecting pool are two pleasing features of the Gallery's distinctive architectural style. The Gallery, with 3000 square feet of display space, is completely modern, air-conditioned, and maintains a varied exhibition schedule of the visual arts during the year. The contents of exhibitions displayed in the University Gallery range from the creations of traditional masters to the latest and most experimental works by the modern avant garde. The minor arts of yesterday and today, along with the creations of oriental and primitive cultures, form topics for scheduled exhibitions. Each exhibition shows for approximately a month, and the Gallery's hours are from 9 a.m. to 5 p.m. daily except Sunday, when they are from 1 p.m. to 5 p.m. The Gallery is closed Saturdays, holidays, and during the month of September.

The Department of Art's Gallery is located adjacent to the department's office area, on the third floor of the classroom building in the Colleges of Architecture and Fine Arts complex. As a direct and physical adjunct to the Art Department's teaching program, this gallery displays smaller traveling exhibitions of merit, as well as student exhibitions and one-man shows by faculty artists. The Gallery is open Monday through Friday from 9 a.m. to noon and from 1:30 p.m. to 4:30 p.m. It is closed Saturdays and Sundays.

COMPUTATIONAL FACILITIES (NERDC AND CIRCA-UF)

In addition to numerous smaller digital and hybrid computers on campus, the University of Florida houses the central facilities of the Northeast Regional Data Center (NERDC) of the State University System. Facilities available to students, faculty, and staff include an Amdahl 470 V/6-II computer (running under OS/MVS with JES 2) with eight megabytes of real memory, more than 26 IBM 3350 disk drives, eight IBM 3330 disk drives, seven 9-track tape drives, and one 7-track tape drive. NERDC facilities are used for administrative, instructional, and research computing for almost all areas of campus and for other state educational institutions in northern Florida.

The Center supports batch processing, 200 high-speed cathode ray tube terminals, and more than 200 low-speed interactive terminals. These terminals support interactive APL/SV, BASIC, WATFIV, ATS, CICS, and a locally written interactive editing and remote-job-entry facility. More extensive output is printed on two centrally located high-speed printers. High-speed remote-batch terminals located on campus are also used for batch input and output. Computer Output Microfiche (COM) is also available.

Extensive software is provided for batch processing supporting the major high-level languages includng FORTRAN, ASSEMBLER, COBOL, PL/1; the SYSTEM 2000 data-base-management system and MARK IV and EASYTRIEVE file handlers and report generators; student-oriented compilers and interpreters including WATFIV, PL/C, ASSIST, WATBOL; most major statistical packages including SPSS, BMDP, SAS; text-editing programs such as TEXT360, ATS, SCRIPT, and FORMAT; several libraries of scientific and mathematical routines including IMSL and the HARWELL library; a large number of program packages and special-purpose languages, plotting software; mini and micro computer support; and many others.

The Center for Instructional and Research Computing Activities at the University of Florida (CIRCA-UF) provides consulting, programming, equipment repair and data-entry services; open-shop unit-record equipment, interactive terminals, and remote batch terminals; and plotting facilities through Gould 5100 Electrostatic, CalComp Incremental Line, and Printronix dot-matrix plotters.

Access through NERDC to four other regional data centers in the State is available through the State University System Computer Network.

More information is available through the NERDC's User Manual and monthly newsletter.

LIBRARIES

The library system consists of two central units, Library West and Library East, and branch libraries serving the Colleges of Architecture, Education, Engineering, Fine Arts, and Law, as well as the Institute of Food and Agricultural Sciences, the J. Hillis Miller Health Center, the Departments of Chemistry and Music, and P.K. Yonge Laboratory School. In addition, reading room facilities have been provided for Journalism and Communications, Physical Education, Health and Recreation, Physics, and the dormitory areas.

The holdings of the Libraries number over 2 million cataloged volumes and a large number of uncataloged documents and newspapers. Many other materials are in the form of microtext.

The main reference and bibliography collection, which includes the basic bibliographies, abstracting and indexing services, and catalogs of other libraries, is located on the first floor of Library West.

Among the special collections of the library system are the Rare Book Collection; the Isser and Rae Price Library of Judaica; the Baldwin Library, which consists of pre-1900 literature for children; the Belknap Collection for the Performing Arts; the P.K. Yonge Library of Florida History; the Marjorie Kinnan Rawlings Collection, which consists of manuscripts, typescripts, and memorabilia of one of America's distinguished novelists; and the Collection of Creative Writing, which includes work sheets, manuscripts, and other literary papers of significant contemporary American and British authors. Special emphasis has been placed upon the Libraries' outstanding Latin American Collection which has particularly strong holdings of West Indian and Caribbean materials.

MONOGRAPH SERIES

The Graduate School sponsors two monograph series devoted to the publication of research primarily by present and former members of the scholarly community of the University. The *Social Sciences Monographs* are published each year with subjects drawn from anthropology, economics, history, political science, sociology, education, geography, law, and psychology. The *Humanities Monographs* are published each year with subjects drawn from art, language and literature, music, philosophy, and religion.

FLORIDA STATE MUSEUM

The Florida State Museum was created by an act of the Legislature in 1917 as a department of the University of Florida. Through its affiliation with the University it carries dual responsibility as the State Museum of Florida and as the University Museum.

The Museum operates as a center of reserach in anthropology and natural history. Its accessory functions as an educational arm of the University are carried forward through interpretive displays and scientific publications. Under the administrative control of the director are the three departments of the Museum: Natural Sciences, staffed by scientists and technicians concerned with the study and expansion of the research collections of animals; Social Sciences, whose staff members are concerned with the study of historic and prehistoric people and their cultures; Interpretation, staffed by specialists in the interpretation of knowledge through museum exhibit techniques and education programs. Members of the scientific and educational staff of the Museum hold dual appointments in appropriate teaching departments. Through these appointments, they participate in both the undergraduate and graduate teaching programs.

Graduate assistantships are available in the Museum in areas emphasized in its research programs.

The Museum is located at the corner of Museum Road and Newell Drive in a modern facility completed in 1970. The public halls are open from 9 a.m. until 5 p.m. Monday through Saturday, and 1 to 5 p.m. on Sundays. The Museum is closed on Christmas Day. There is no admission charge.

The research collections are under the care of curators who encourage the scientific study of the Museum's holdings. Materials are constantly being added to the collection both through gifts from friends and as a result of research activities of the Museum staff. The archaelogical and ethnological collections are noteworthy. There are extensive study collections of birds, mammals, mollusks, reptiles, amphibians, fish, invertebrate and vertebrate fossils, and bioacoustic archive consisting of original recordings of animal sounds. Opportunities are provided for students, staff, and visiting scientists to use the collections. Research and field work are presently sponsored in the archaelogical, paleontological, and zoological fields. Students interested in these specialties should make application to the appropriate teaching department.

UNIVERSITY PRESSES OF FLORIDA

The University of Florida is host to the State University System's scholarly publishing facility, University Presses of Florida. The goals of the systemwide publishing program implemented by University Presses of Florida are expressed in Board of Regents' policy:

> . . . to publish books, monographs, journals, and other types of scholarly or creative works. The Press shall give special attention to works of distinguished scholarship in academic areas of particular interest and usefulness to the citizens of Florida. The Press shall publish original works by state university faculty members, but it may also publish meritorious works originating elsewhere and may republish out-of-print works.

Each university's faculty publishing committee is independently responsible for selecting works for publication through the facilities of University Presses of Florida. At the University of Florida, the University Press Board of Managers oversees the locally determined publishing program.

The purpose of the University of Florida Press is to encourage, seek out, and publish original and scholarly manuscripts which will aid in developing the University as a recognized center of research and scholarship. In addition to its broad range of state, regional, and Latin American titles, the Press publishes books of general interest and five separate series in Floridiana, gerontology, humanities, Latin American studies, and social sciences.

The Press Board of Managers, 15 faculty experts appointed by the President of the University, determines policies of publication relating to the acceptance or rejection of manuscripts and the issuance of

author contracts. Each year the board examines numerous manuscripts submitted not only by the University faculty but by authors from all over the United States, Europe, and Latin America.

University Presses of Florida is a member of the Association of American University Presses and of the Association of American Publishers, Inc.

Students and members of the faculty and staff are cordially invited to visit the Press offices at 15 N.W. 15th Street, adjacent to the campus.

INTERDISCIPLINARY GRADUATE STUDIES PROGRAMS

INTERNATIONAL STUDIES

As the leading institution of higher education in the State, the University of Florida has long been aware of Florida's unique international position. By the beginning of the century, the University had begun to focus its attention on the Latin American nations. Advanced degrees were given in Latin American studies as early as 1927, and by the midcentury a School of Inter-American Studies had been formed.

During the last two decades, the University of Florida's commitment to international studies has expanded rapidly. This expansion has resulted in the creation of a Center for Latin American Studies, a Center for African Studies, a Center for Tropical Agriculture, a program in International Relations, and an English Language Institute for speakers of other languages. Programs in Asian Studies, Soviet and East European Studies, and West European Studies have been added to the undergraduate curriculum. The University of Florida has participated in programs of assistance and development in many major areas of the world: Africa, South America, Middle America, and Southeast Asia. There has also been a corresponding increase in the number of faculty members involved in teaching and in research within the field of international studies.

As evidence of its commitment to international programs, the University opened, in January 1971, the $1.6 million federally funded Graduate School and International Studies Building, dedicated and named Linton E. Grinter Hall. The modern four story building contains 60 faculty offices, 102 study cubicles, and nine seminar rooms, as well as the office of the Graduate School and Sponsored Research.

The expansion of efforts in these directions represents a conviction on the part of the University that today's students must be aware, in more than a superficial way, of developments and trends outside our national boundaries if they are to live in a world of peace and harmony. International education is essential for the citizenry and leaders of the twenty-first century—the students of today.

The Center for African Studies, established with financial assistance under Title VI of the National Defense Education Act, is responsible for the direction and coordination of interdisciplinary instructional and research activities related to Africa. It cooperates with departments in administering and staffing a coordinated Certificate Program in African Studies. This program provides a broad foundation for students preparing for teaching or other professional careers in which a knowledge of Africa is essential.

Graduate Fellowships and Assistantships.—Students admitted to the Graduate School in pursuit of a degree through a specific department are eligible to compete for graduate assistantships and Title VI (NDFL) fellowships through the Center for African Studies.

Extracurricular Activities.—The Center regularly sponsors conferences on African topics, and a colloquium series—BARAZA—with invited lecturers. The Center has a fairly wide ranging set of outreach activities addressed to public school teachers as well as community colleges and other universities. Two major functions are the publication of the *Bulletin of the Southern Association of Africanists,* and a traveling African art exhibit.

Library Resources.—The Center supports directly as well as through various departments selective library acquisitions to meet the instructional and research needs of the faculty and students. The Office of Instructional Resources holds a number of educational films on African topics, and the audiovisual library of the Department of Art holds approximately 5,000 African art slides.

African Art—The University Gallery holds 121 pieces of African sculpture. The Rosenbloom Collection, 37 pieces of African sculpture, is housed at the Florida State Museum.

Graduate Degree Programs.—The African Studies Center does not offer interdisciplinary graduate degrees. With the cooperation of its participating departments, it offers a Certificate in African Studies in conjunction with the M.A. and Ph.D. degrees.

Requirements for the Certificate in African Studies with the Master of Arts degree are (a) at least 24 credits of course work in a departmental major, 20 of which should relate to Africa; (b) 12 credits of course work related to Africa and distributed in at least two other departments; (c) a structural knowledge of an African language; and (d) a thesis on an African topic.

Requirements for the Certificate in African Studies with the doctoral degree are (a) the doctoral requirements of the major department; (b) 27 credits of African language or area course work in two or more departments outside the major; (c) a dissertation on an African topic based on field work in Africa; (d) knowledge of a language appropriate to the area of specialization.

Inquiries about the various programs and activities of the Center should be addressed to the Director, Center for African Studies, 470 Grinter Hall.

International Relations, a field of specialization leading to the M.A. and Ph.D. degrees, is offered in programs through the Department of Political Science. In addition to the M.A. and Ph.D. with a major in political science which may emphasize international relations, the University offers an M.A. and Ph.D. with a major in international relations. For the M.A. the requirements are the same as for the M.A. in political science. For the Ph.D. the student has the option of taking either 1) four fields of political science and a single or composite minor, or 2) three fields of political science (plus two graduate courses in a fourth field) and two minor fields or a composite minor.

The Center for Latin American Studies is responsible for directing and coordinating graduate training, research, and other academic activities related to the Latin American area.

Master of Arts Degree in Latin American Area Studies.—The interdisciplinary area degree offered through the Center can be pursued in two options. The first is a traditional program which emphasizes training and research focused on developing a greater

appreciation and understanding of Latin America's cultures, traditions, and languages. Requirements for the major concentration are 21 credits consisting primarily of Latin American language or area courses in one department, which may be agricultural and extension education, anthropology, economics, food and resource economics, geography, history, political science, Romance languages (Spanish and Portuguese), or sociology.

The second alternative clusters course work and research along a selected topical field, with the emphasis placed on training in interdisciplinary problem-solving methodologies and their application to contemporary Latin American problems. Under this option, and especially with regard to the training of students from Latin America, an individualized program of instruction is developed to build on prior professional or administrative experiences and prepare the individual for technical and professional work in the home country. Requirements for the major are 21 credits in an interdisciplinary, applied course of study focused on Latin America which may include such fields as rural or urban development, regional analysis, demography, social change, tropical agriculture, natural resource management, health delivery, or mass communications.

Other requirements, common to both options, include 18 credits of Latin American language and/or area courses in at least two other departments; a thesis on a Latin American topic for which up to nine credits are given through registration in LAS 6971; and a reading, writing, and speaking knowledge of a Latin Amerian language.

The M.A. with a program in Latin American Area Studies is intended primarily as a terminal degree for persons who are not aiming at a teaching career in traditional academic departments but who require either a broad knowledge of Latin American cultures and appropriate language competence or interdisciplinary, problem-related, area-focused training for their professional career objectives. This program is so structured, however, that students may move directly from it into departmental Ph.D. programs without interrupting or slowing down their academic progress.

Minimum requirements for admission to the program are (1) a grade average of B (3.00) for all upper-division undergraduate work; (2) a combined Verbal-Quantitative score of at least 1000 on the Graduate Record Examination; (3) an adequate proficiency in reading, writing, aural comprehension, and speaking of either Spanish or Portuguese. Students not meeting the required proficiency will be required to take an appropriate remedial course.

Exceptions to the above requirements are made only when these and other criteria, such as letters of recommendation, are reviewed by the Center, recommended by the Center, and approved by the Dean of the Graduate School.

Master's Degree with a Certificate in Latin American Studies.—Through agreement with departments of participating colleges (Liberal Arts and Sciences, Business Administration, Education, Journalism and Communications, and Agriculture) students in master's programs requiring theses may earn a Certificate in Latin American Studies. The requirements are (a) at least 30 credits of work in the major department with a Latin American concentration, (b) a nine-credit minor with Latin American content in another department, (c) a thesis on a Latin American topic for which up to nine credits are given, and (d) a reading knowledge of a Latin American language.

Certificates in Latin American Studies may be awarded to students in nonthesis programs who (a) satisfy departmental requirements for the major and minor, (b) include in their courses of study at least 18 hours of Latin American content courses divided between at least two disciplines other than the major, (c) complete at least 54 credit hours of graduate course work, and (d) demonstrate a reading knowledge of a Latin American language. In choosing area courses, the student taking this option should work closely with the graduate coordinator of the Center for Latin American Studies. Only those courses specifically approved by the coordinator will be counted toward the required 18 hours of Latin American concentration.

Doctoral Program with a Certificate in Latin American Studies.—The Center does not offer an interdisciplinary Latin American Area Studies degree at the doctoral level. However, it does provide a Certificate in Latin American Studies which is awarded in conjunction with doctoral degrees in the following areas: agriculture, anthropology, business administration, economics, education, food and resource economics, geography, history, political science, sociology, and Spanish. Requirements for the doctoral certificate are (a) Latin American concentration within the major department; (b) an area minor of at least 30 credits consisting principally of Latin American language and area courses in two or more departments outside the major and including at least five credits of LAS 6938, Latin American Area Seminar; (c) a dissertation on a Latin American subject; (d) a reading, speaking, and writing knowledge of one Latin American language and a reading knowledge of another; (e) residence in Latin America normally of at least six months duration and devoted primarily to dissertation research.

A Certificate in Latin American Demographic Studies may be earned in conjunction with an M.A. or Ph.D. program in economics, geography, or sociology.

Graduate Fellowships and Assistantships.—In addition to University fellowships and assistantships available to students on a competitive basis in the programs described above, the Center for Latin American Studies administers financial assistance from outside sources, including Title VI, NDFL fellowships.

Research.—The Center supports or participates in a number of interdisciplinary research programs which, in addition to their primary objectives, provide opportunities for training and financial support of graduate students.

Library Resources.—The several libraries on the campus of the University of Florida, including the Latin American Collection of the main library, have Latin American holdings totaling over 160,000 volumes as well as important manuscript materials in the original, in transcription, and on microfilm. In terms of subject matter, holdings are strongest in history and the social sciences, but increasing attention is being given to the environmental sciences and to literature. In terms of region, they are strongest in the Caribbean and circum-Caribbean, but Brazilian materials are being augmented rapidly.

Other Activities.—The Center sponsors conferences and colloquia on Latin American topics, supports publication of scholarly books, monographs, and papers, and cooperates with other University units in

conducting developmental programs in Latin America.

Inquiries about the various programs and activities of the Center should be addressed to the Director, Center for Latin American Studies, 319 Grinter Hall.

The Center for Tropical Agriculture, within the Institute of Food and Agricultural Sciences, seeks to stimulate interest in research and curriculum related to the tropical environment and its development.

Minor in Tropical Agriculture.—An interdisciplinary minor in tropical agriculture may be planned at both the master's and doctoral levels by students majoring in agriculture, forestry, and other fields where knowledge of the tropics is relevant. The minor may include courses treating characteristics of the tropics: its soils, water, vegetation, climate, agricultural production, and the language and culture of tropical countries.

Certificate Programs.—A program for a specialization (with certificate) in tropical agriculture for graduate students in the College of Agriculture is available. The program provides course selection to broaden the normal degree requirements for those interested in specializing in tropical agriculture. Approved courses must be selected from four basic groups as follows: area studies, international economics, tropical ecosystems, and tropical agriculture. For nonagriculture students a similar program with a Certificate in Tropical Studies is available. Students interested in these programs should consult the Dean of the College of Agriculture.

Research.—The Center provides research grants to faculty members and their graduate students and assists in the coordination of interdisciplinary research funded elsewhere. Development assistance contracts in agriculture and related fields frequently have research components.

Student Support.—Students within the College of Agriculture and the School of Forest Resources and Conservation pursuing a minor in tropical agriculture are eligible for research grants awarded by the Center through academic departments.

Other Activities.—The Center seeks a broad dissemination of knowledge about tropical agriculture through the sponsoring of conferences and seminars featuring leading authorities on the tropics; publication of books, monographs and proceedings; and through acquisition of materials for the library and the data bank.

The Organization for Tropical Studies (OTS) is a consortium of major educational and research institutions in the United States and abroad, created to promote understanding of tropical environments and their intelligent use by man. The University of Florida is a charter member. Graduate field courses in Central America are coordinated from the regional office in Costa Rica. Courses with varying content are offered in the agricultural sciences, earth sciences, forestry, geography, marine science, meteorology, and terrestrial biology during the winter, spring, and summer terms. Additional courses are being planned. Students are selected on a competitive basis from universities throughout the country. A University of Florida graduate student may register for 12 credits in an appropriate departmental course cross-listed with OTS, e.g., PCB 6357C or GEA 6109. The University of Florida does not require tuition for OTS courses. OTS offers pilot-study research grants to junior faculty and graduate students who have had limited tropical experience. Further information can be obtained from the OTS campus office located in the Center for Tropical Agriculture, 2001 McCarty Hall.

BIOLOGICAL SCIENCES

The Division of Biological Sciences is organized within the College of Liberal Arts and Sciences to provide coordination in the biological sciences. The Division, with a staff from many disciplines, has organized graduate programs in ecology and population biology, physiology, tropical biology, evolutionary biology, marine biology, paleobiology, and systematics. Each faculty is responsible for developing and supervising a core program in its special area. In addition to cross-department programs, the Division serves to coordinate biological science wherever it exists in the University and to operate marine research stations on the east and west coasts of Florida. It represents the University in the *Organization for Tropical Studies*, a consortium of 29 major U.S. universities which operates three tropical field stations and an extensive field course program in Costa Rica. Many biology graduate students here are able to participate in these OTS graduate courses and expand their research projects from the courses into thesis or dissertation topics. The Department of Zoology and Botany are the units composing the Division of Biological Sciences.

The University of Florida Marine Laboratory at Seahorse Key is located 57 miles west of Gainesville on the Gulf Coast, 3 miles offshore, opposite Cedar Key. Facilities include a 20x40-ft. research and teaching building, and a 10-room residence, with two kitchens and a dining-lounge, which provides dormitory accommodations for 24 persons. The laboratory, which owns a 32-ft. research vessel equipped for offshore work and several smaller outboard-powered boats for shallow water and inshore work, is used for research by graduate students from the various departments of the Division of Biological Sciences.

The University of Florida Cornelius Vanderbilt Whitney Marine Laboratory at Marineland is designed for research and instruction in marine biological sciences. Facilities are available for research in all fields of modern biology, encompassing the techniques of biophysics, biochemistry, microbiology, morphological and functional biology, pathology, marine medicine, pharmacology, and nutrition. Field studies involve both ecological and environmental problems. Research opportunities for graduate students are available through faculty members who use this laboratory.

Biophysics and bioengineering are interdisciplinary areas which bring the concepts and methods of the basic and applied physical sciences to bear upon biological problems. Students may elect one or another of these programs depending upon their backgrounds, the extent of their interest and abilities in physical sciences, and their concern with and competence in development of new physics or engineering for use in biology.

One program is conducted under the supervision of a Biophysics Council, which includes representatives from the Colleges of Agriculture, Liberal Arts and Sciences, Engineering, and Medicine. Several departments offer biophysics options at the graduate level. A student interested in such an option must qualify for graduate study in a department and satisfy the advanced degree requirements established by the departmental faculty. The Biophysics Council may then provide individual guidance in curricular matters. For information on this program, write to the representative of the Biophysics Council in one of the

following departments: Biochemistry and Molecular Biology, Chemical Engineering, Chemistry, Electrical Engineering, Entomology and Nematology, Materials Science and Engineering, Microbiology and Cell Science, and Zoology. The Council representative in Physics should be consulted for advice on courses and seminars in biological physics.

The Departments of Chemical and Electrical Engineering offer master's and doctoral study programs in biochemical and biomedical engineering, respectively; and advanced study and research in biomaterials is available in the Department of Materials Science and Engineering. Write to the department concerned for further information.

A program in biological physics is conducted within the Department of Physics. Students in this option must qualify for admission to graduate studies in physics and satisfy all of the requirements for a regular advanced degree in the department. In addition these students must prepare themselves in organic and physical chemistry and general biology, to the extent that they can study and demonstrate knowledgeability in molecular biology, cytology, and physiology. Research studies are generally conducted in collaboration with scientists in biological or medical fields on this campus or elsewhere. Doctoral candidates must contribute to new knowledge in both physics and biology, and demonstrate ability to select for themselves significant new problems in biology. This program is monitored by the graduate faculty in physics and by two interdisciplinary advisory committees; of the latter two, one is comprised of members from pertinent physical and biological disciplines on this campus, and the other of bioscientists from outside the University. For further information write to the Biological Physics Program, Department of Physics.

Attention should also be given to the program of the Center for Sensory Studies, as described in the section on *Interdisciplinary Research Centers*, since that Center includes other biophysical programs.

THE CENTER FOR ALLIED HEALTH INSTRUCTIONAL PERSONNEL

The Center (CAHIP) is a project jointly sponsored by the Colleges of Education and Health Related Professions, and was originally funded under the terms of a grant from the W.K. Kellogg Foundation.

Persons who desire to enroll in graduate programs for the master's or doctoral degree as preparation for careers in teaching or administration in the allied health professions should possess (a) a baccalaureate degree, (b) credentials acceptable for admission to the Graduate School of the University of Florida, and (c) a stated plan for teaching or leadership positions in the allied health fields in two-year or four-year colleges or universities.

Students accepted for admission to any advanced degree program will fulfill the basic requirements of that program and such other courses of study relating to allied health as may be appropriate for their stated goals. Each individual's program is planned, insofar as possible, according to these objectives.

Applicants who desire to assume teaching responsibilities should have a minimum two years employment experience in a clinical field, and should possess appropriate licensure, registration, or certification in that field. Those who have had no previous teaching experience will be required to complete a two-quarter teaching practicum. Examples of a few of the clinical fields from which students will be considered (but not limited to) include medical technology, nursing, occupational therapy, physical therapy, radiologic technology, respiratory therapy technology, cardiovascular technology, medical records technology, dental hygienic technology, dentistry, dental laboratory technology and physicians' assisting.

Requests for further information should be sent to the Director, Center for Allied Health Instructional Personnel, Box 2528 Norman Hall.

ENGINEERING: STATE CENTER

The College of Engineering has established an off-campus graduate engineering education center at Eglin Air Force Base where qualified personnel may enroll in courses leading to the master's degree. For admission to the graduate program, the prospective student must file an application with the Graduate School as outlined in the *Admissions* section of this *Catalog*.

For additional information, visit the Eglin Air Force Base, or write the Dean, College of Engineering, University of Florida.

THE OAK RIDGE ASSOCIATED UNIVERSITIES

The University of Florida is a sponsor of Oak Ridge Associated Universities (ORAU), a nonprofit education and research management corporation of 43 colleges and universities. ORAU, which was established in 1946, conducts programs of research, education, information, and human resource development for a variety of government and private organizations. It makes extensive use of the facilities and resources of the Oak Ridge National Laboratory and is particularly interested in three areas: energy, health, and the environment.

Among ORAU's activities are competitive programs to bring undergraduates, graduate students, and faculty members to work on research problems at the research facilities of the United States Department of Energy. Participants are selected by ORAU and the staffs of the facilities participating in the ORAU programs—Oak Ridge National Laboratory; the Oak Ridge Y-12 Plant; the Oak Ridge Gaseous Diffusion Plant; the Atmospheric Turbulence and Diffusion Laboratory in Oak Ridge; the Savannah River Laboratory and Savannah River Ecology Laboratory in Aiken, S.C.; the Comparative Animal Research Laboratory in Oak Ridge; the Puerto Rico Nuclear Research Center; and the Energy Research Centers at Bartlesville, Okla., Pittsburgh, Pa., and Morgantown, W. Va. The ORAU Institute for Energy Analysis, the Special Training Division and the Medical and Health Sciences Division are also open to qualified students and faculty members.

Undergraduate.—The ORAU Undergraduate Research Training Program offers juniors majoring in the sciences, engineering, and mathematics an opportunity to spend 10 weeks during the summer working in directed research programs at these sites.

Graduate.—The ORAU Laboratory Graduate Participation Program enables a candidate for an advanced degree, upon completion of all requirements for work-in-residence except research, to work toward

completion of a research problem and preparation of the thesis at one of the participating sites.

Faculty.—University of Florida faculty members under the ORAU Faculty Research Participation Program can go to a Department of Energy facility for varying periods up to three months for advanced study and research. It is also possible to combine a University of Florida faculty development grant with a longer ORAU Faculty Research Participation appointment.

Stipends are available. The student stipends are at fixed rates that change from time to time. Faculty stipends are individually negotiated, based upon the current University salary.

Copies of the bulletin and announcement of the ORAU-DOE university-laboratory programs are available in the offices of the Graduate School and the Department of Physics. Bulletins also may be obtained by writing to the University Programs Office, Oak Ridge Associated Universities, Inc., P.O. Box 117, Oak Ridge, Tenn. 37830.

Interested persons should ask for assistance from the Chairman of the Department of Physics who serves as the ORAU Counselor at the University of Florida. All arrangements for these research programs will be made between the Dean of the Graduate School and Oak Ridge Associated Universities.

PUBLIC ADMINISTRATION

A complete description of the programs in public administration is included in the departmental listing for Political Science.

RESEARCH ORGANIZATIONS

FLORIDA AGRICULTURAL EXPERIMENT STATIONS

The Florida Agricultural Experiment Stations are responsible for research leading to the improvement of all phases of Florida's widely varied agricultural production, processing, and marketing. The statewide research program is administered from the University of Florida campus by the Dean for Research and includes main station departments as well as Agricultural Research and Education Centers operating as an integral administrative unit. As a statewide agency having agricultural research as its primary objective, each station cooperates closely with numerous Florida agricultural agencies and organizations.

Many members of the research staff of the Agricultural Experiment Stations are also members of the faculty of the College of Agriculture as are some in the Cooperative Extension Service and the Center for Tropical Agriculture. These three agricultural units of the University of Florida Institute of Food and Agricultural Sciences work cooperatively in many areas under the administration of the Vice President for Agricultural Affairs.

Funds for graduate assistants are made available to encourage graduate training and professional scientific improvement.

Research at the main station is conducted within 21 areas—Agricultural Engineering, Agricultural and Extension Education, Agronomy, Animal Science, Botany, Dairy Science, Entomology and Nematology, Food and Resource Economics, Food Science and Human Nutrition, School of Forest Resources and Conservation, 4-H, Fruit Crops, Home Economics, Microbiology and Cell Science, Ornamental Horticulture, Plant Pathology, Poultry Science, Soil Science, Statistics, Vegetable Crops, and Veterinary Medicine. In addition to the above, the main station has six units vital to its research programs, namely, editorial, library, facilities operations, planning, business affairs, and the grants office.

The Agricultural Research Centers are located at Monticello, Brooksville, Ft. Pierce, Immokalee, Dover, Ft. Lauderdale, Hastings, Ona, Apopka, Marianna, Live Oak, Leesburg, Lakeland, Jay, and Ocala.

The locations of the Agricultural Research and Education Centers are at Homestead, Belle Glade, Bradenton, Lake Alfred, Quincy, Sanford, and Tallahassee (FAMU).

The Florida Agricultural Experiment Stations are cooperating with the Brooksville Beef Cattle Research Station, Brooksville, a USDA field laboratory, in its beef cattle and pasture production and management programs and with the National Weather Service, Ruskin, in the agricultural weather service for Florida.

In addition to the above, research is conducted through the International Programs office and the Centers for Environmental Programs and for Rural Development.

DIVISION OF SPONSORED RESEARCH

The Division has two general functions: (1) the administration and promotion of the sponsored research program and (2) the support of the total research program of the University in a manner which produces maximum benefit to the University and the greatest service to the State of Florida. All proposals for the sponsorship of research, grants-in-aid, training grants, or educational service agreements must receive the approval of the Division Director. Subsequent negotiations with potential contracting agencies or sponsors of research projects are carried on under the Director's supervision.

The activities of the Division of Sponsored Research are intended to stimulate growth and to assist in expanding a balanced research program throughout the University. These activities are intimately related to the support of the graduate program. They are also intended to relieve principal investigators and departments of many of the detailed administrative and reporting duties connected with some sponsored research. The duties and responsibilities of the Division are designed to assist principal investigators in seeking sponsors for their projects. In direct contacts between a principal investigator and a potential sponsor, however, prior clearance should be obtained from the Division to insure a uniformity in contract requirements and to avoid duplication of negotiations with the same sponsor.

The Dean of the Graduate School is the Director of the Division of Sponsored Research and is administratively responsible to the Vice President for Academic Affairs. Policies and procedures for the operation of the Division are developed by a Board of Directors working with the Division Director within the general framework of the administrative policies and procedures of the University. The Graduate Council serves as adviser on scientific matters and on matters relating to the graduate program.

The law establishing the Division of Sponsored Research enables the utilization of some recovered indirect cost funds in the support of innovative re-

search. The Board of Directors of the Division has the responsibility for the award of these funds. For information write the Director, Division of Sponsored Research, 219 Grinter Hall.

FLORIDA ENGINEERING AND INDUSTRIAL EXPERIMENT STATION

The Station (EIES) developed from early research activities of the engineering faculty and was officially established in 1941 by the Legislature as an integral part of the College of Engineering. Its mandate is "to organize and promote the prosecution of research projects of engineering and related sciences, with special reference to such of these problems as are important to the industries of Florida."

The college and the Station are inextricably intertwined—the two activities cannot be separated functionally; they comprise the two arms of the whole engineering body. This is particularly true at the graduate level. In many instances a program initiated primarily as a research activity has developed into a full-fledged academic department of the college, demonstrating the close interlocking relationship of the research and teaching functions.

Since the fall term of 1967, seven departments of the College of Engineering and the Experiment Station have moved into some 310,000 sq. ft. in seven modern new buildings and one remodeled building. These improvements, including equipment, have raised the value of the physical plant of the college to over $13 million.

The laboratories, staff, and facilities of other divisions of the University are also available to the Station research faculty through many outstanding interdisciplinary programs which provide Station support of graduate students in the physical sciences such as physics and chemistry, as well as engineering. With the close relationship that exists between teaching and research, students are exposed to many engineering and industrial problems normally not encompassed in a college program.

The Station receives only a small portion of its operating revenue from the state. The major support of its research activities is derived from contracts with government agencies, foundations, and industrial organizations. Large and small manufacturers avail themselves of the finest engineering research laboratories in the Southeast. The Station has superior facilities and staff in such fields as microelectronics and integrated circuits, power systems, metallurgy, ceramics, coastal engineering, soil mechanics, transport phenomena and fluid dynamics, energy conversion, air and water pollution control, electrochemistry, fast neutron physics, nuclear rocket propulsion, dynamics and vibrations, communications, kinetics, ionics, gaseous electronics and plasmas, computer and information science, and systems analysis.

The Coastal and Oceanographic Engineering Laboratory, a unit of EIES, administered through the Department of Coastal and Oceanographic Engineering, conducts research on problems of the shoreline and of coastal and inland waters and renders advisory service to public agencies and industry. Interdisciplinary and multidisciplinary research and graduate instruction are closely coordinated and related to applications of the coastal zone. Many graduate students are supported by research programs of the COE Laboratory which include (1) air-sea interaction and the generation of surface waves; (2) scale models of inlets and shore structures; (3) transportation of sediment by waves and currents; (4) wave and current effects at offshore nuclear power plants; (5) water temperature variations near power-generating plants; (6) tidal variations in inland waters; (7) littoral transport under wave action and many others; (8) coastal defense measures.

Laboratory research facilities include (1) a large area for carrying out hydraulic model studies of coastal phenomena; (2) an air-sea interaction facility to investigate wave generation phenomena; (3) an internal wave facility to investigate subsurface wave phenomena; (4) a wave tank in which the effects of waves on structures, sand motion, etc., can be investigated; and (5) a hydraulic tilting flume for basic studies of the interaction of flows with sediments. Field investigations, representing a substantial portion of the research effort, are supported by a mobile field station, three small boats, and a complete range of tide recorders, current meters, sounding and other auxiliary equipment.

INTERDISCIPLINARY RESEARCH CENTERS

ACCOUNTING RESEARCH CENTER

The Center, as part of the School of Accounting, conducts basic and applied research on the relationship between accounting information and decision making and behavior. It is an organization through which faculty members from various disciplines may work together in attempting to solve problems facing the accounting profession and users of accounting information.

The Center has available for distribution *Accounting Research Center Working Papers* which report on research currently in progress at the Center. For information on the Center or the working papers, write to the Director, Accounting Research Center, School of Accounting, 102 Bryan Hall.

CENTER FOR AERONOMY AND OTHER ATMOSPHERIC SCIENCES

The Center (ICAAS) is a community of scholars drawn from many disciplines represented at the University of Florida. Each scholar has an established professional knowledge and research capability in the atmospheric sciences or in physical, biological, or societal disciplines that relate closely to our atmospheric environment. As an interdisciplinary center, ICAAS promotes pure and applied research in the atmospheric sciences and provides machinery for translating research into forms relevant to societal needs. The aeronomical research of the Center deals with physical, chemical, and electrical processes in the upper atmosphere; e.g., the stratospheric, ionospheric, and thermospheric regions of the earth. Other activities include a diverse range of tropospheric and micrometeorological research as well as biological, ecological, and technological research related to the quality of the air we breathe. These activities are dispersed widely in the Colleges of Liberal Arts and Sciences, Agriculture, Engineering, Medicine, Law, and Business Administration. Current research deals with ultraviolet radiation levels which might reach the earth's surface should our

stratospheric ozone layer be de pleted by the effluents from a future supersonic trans port fleet or by the release of fluorocarbons. Of sp ecific concern are the potential effects of changes in UV upon the incidence of skin cancer, agricultural pr oductivity, cells, and insects. A second active are a of research relates to energy/air quality problems of Florida. The Center is involved in a study of sulph ur oxide effects on Floridians in a study encompass ing medical effects of sulphur oxide, dose respon se modeling, risk-benefit analysis, decision modelin g, and public policy alternatives.

A third active area of research is a comprehensive study of coal burning issu es that impact upon Florida, such as, future coal den and, availability, transportation, air and water deg radation, and socioeconomic consequences.

The primary funtion of ICAAS is to provide coordination, direction, and focus to strengthen existing programs and to expa nd them in directions that will help mitigate the so cio-technical problems arising from the degradatio n of our atmospheric environment. The Center wi ll also help the training of able students at the und ergraduate, graduate, and postdoctoral levels in va rious pure and applied aspects of the atmospheric sci ences. For information, write the Director, Center for Aeronomy and Other Atmospheric Science s, 221 Space Sciences Research Building.

CENTER FOR A PPLIED MATHEMATICS

The Center c onsists of faculty from the Departments of Engi neering Science and Mathematics. These faculty are interested in the application of mathematics to research problems in the physical, engineering, soci al, and biological sciences. Codirectors are Professors A. R. Bednarek and K.T. Millsaps.

CENTER FO R APPLIED THERMODYNAMICS AND CORR OSION

The Cent er facilitates cooperation between research tean s at the University of Florida and the Belgian Co rrosion Research Center at Brussels. Research is c onducted in electrochemistry, in high temperature oxidation, and in physical and process metallurgy , with applications in corrosion-related environmen tal problems, such as pollution, water desalination , atomic energy, and surgical implants. For informati on, write the Director, Center for Applied Thermod lynamics and Corrosion, 132 Metallurgical Engineer ing Building.

CENTE R FOR AQUATIC SCIENCES

The Center is responsible for intensive development and coordination of University-wide activities in the freshwater, estuarine, and coastal marine sciences. With major emphasis on Florida and contiguo us waters, the Center provides leadership for interdi sciplinary programs of benefit to the state. The broa d spectrum of curricula, facilities, and faculty at the University allows students great latitude in develo ping their specific interests in the aquatic science s. Field research facilities are available at nearby Ce dar Key, Welaka, and Marineland. Interested perso ns should contact the Director, Center for Aquatic Sc iences, 2001 McCarty Hall.

BEHAVIORAL AND SOCIAL SCIENCES INSTITUTE

The Institute seeks to develop the research capability and productivity of younger faculty at the University of Florida by granting funds for research expenses through competitive awards in all fields of the behavioral and social sciences. For information, write the Director, Behavioral and Social Sciences Institute, 114 Psychology.

CLINICAL RESEARCH CENTER

The Center, part of the Shands Teaching Hospital, provides a carefully controlled medical research environment in which scientists can define and attempt to conquer unsolved disease problems affecting humans.

A discrete unit, funded entirely through a grant by the National Institutes of Health (NIH), the Center is administered through the College of Medicine of the University of Florida. The grant provides for a metabolic kitchen and its staff, a laboratory and staff, and nursing and administrative personnel. The NIH provide coverage of all research charges for patient care and also support an out-patient function on the Center.

For information write Clinical Research Center, Box J-322, J. Hillis Miller Health Center.

INSTITUTE FOR ADVANCED STUDY OF THE COMMUNICATION PROCESSES

The Institute for Advanced Study of the Communication Processes (IASCP) is designed to provide opportunities for University faculty and advanced students to carry out research in the area of the communication processes. Organizationally, it is structured on an interdisciplinary base, with membership drawn from appropriate units and departments—primarily from colleges such as Liberal Arts and Sciences, Engineering, Medicine, Dentistry and Fine Arts. While IASCP's main site is at the University of Florida in Gainesville, it is structured to serve the entire State University System; currently there are active participants from Florida State University, the University of South Florida, and Florida International University. Moreover, the IASCP faculty includes members located at other universities and research laboratories both within the continental United States and abroad. The overall objective of IASCP is the maintenance of a scientific center of excellence focused on human communicative behavior. The institute's program includes (but is not confined to) three broad areas: 1) the communicator(s), i.e., the physiological/physical/psychological processes by which individuals generate and transmit communicative signals (speech), 2) the respondent(s), how their receptive (hearing) and neural mechanisms function to process signals within a variety of environments, and 3) the message, i.e., the codes and signs (language) that constitute the sum total of these communicative messages. The IASCP faculty includes students and scientists with a variety of interests and training. Expertise is represented by the phonetic sciences, psychology, psycholinguistics, linguistics, psychoacoustics, auditory neurophysiology, electrical engineering, computer sciences, physics, communication studies, biocommunication, dentistry, and medicine. As stated, IASCP's overall research effort is

basically an interdisciplinary one, but the focus of each investigator's interests is the advancement of knowledge about human communication. For information, write the Director, Institute for Advanced Study of the Communication Processes, 63 Arts and Sciences Building.

COMMUNICATION RESEARCH CENTER

The Center conducts pure and applied research in a variety of fields of mass communication. It also serves as a resource for college faculty and students in their own research, assists the media and other organizations in their research pursuits, and sponsors other programs related to the mass communication needs of the many communities served by the University. For information, write the Director, Communication Research Center, 400 Stadium Building.

CENTER FOR CONSUMER RESEARCH

The Center conducts basic and applied research on factors influencing consumer decision making and behavior. It provides an organization through which faculty members from a number of disciplines may effectively work together to study the interface between consumers, various institutions, activities of governmental and private organizations and policy alternatives. The needs and behavior of special consumer groups (e.g., the elderly, children) and the impact of particular consumer attitudes and choice behavior in relation to their own and societal goals are of particular interest. Several assistantships are available each year to graduate students. For information, write the Director, Center for Consumer Research, 202 Matherly Hall.

INSTITUTE FOR DEVELOPMENT OF HUMAN RESOURCES

The Institute is an interdepartmental research and demonstration activity of the College of Education. Membership is open to all faculty in the University. Organized in 1966 to foster research into factors influencing learning and development from cradle to grave, the Institute for Development of Human Resources has received grant funds from state, federal, and private sources to foster both research and its dissemination to school systems and other educational agencies.

The major programmatic efforts have been (1) parent education (for parents of toddlers and infants and parents of kindergarten through third grade children); (2) systematic observation of teacher-pupil classroom behavior in elementary and secondary schools; (3) studies of learning from the viewpoint of aptitude treatment interaction; (4) studies of parent-child interaction; and (5) studies of curriculum efforts which relate to the learner's self-development; (6) studies of cognitive processes in learning. The focus of these efforts is on research which leads to the improvement of educational practice.

CENTER FOR DYNAMIC PLASTICITY

The Center conducts research and educational programs and disseminates information on the behavior of materials at high rates of deformation. In addition to structural materials (such as metals, polymers, and composites), the Center is concerned with biological materials (bones and soft tissues) and with dynamic soil mechanics. The Center has established a cooperative arrangement with the University of Bucharest to enhance international cooperation and exchange of information and personnel. For information, address the Director, Center for Dynamic Plasticity, 231 Aero Building.

BUREAU OF ECONOMIC AND BUSINESS RESEARCH

The Bureau is the research division of the College of Business Administration. A part of the Bureau's work is designed to further understanding of the economy of Florida and the Southeast. Economic, business, and related research supported by grant and the contract funds is undertaken in subject areas of interest to the faculty. Graduate students are involved also in these projects.

The Bureau publishes six periodicals, *Dimensions, Economic Leaflets, Population Studies, The Florida Outlook, Florida Economic Indicators* and an annual publication, *Florida Statistical Abstract*. Through these publications and through monographs, the Bureau disseminates the results of research and statistical studies on population, personal income, employment, building construction, and other subjects. For information, write the Director, Bureau of Economic and Business Research, 221 Matherly Hall.

CENTER FOR GERONTOLOGICAL STUDIES

The Center provides an organization through which faculty members from many disciplines may work effectively both within and outside the University to study the problems of aging, to develop programs of benefit to the aged, to provide career-related experiences for graduate and professional students, and to disseminate information derived from research in health care, housing, transportation, and other areas.

The Summer Institute on Gerontology and several in-service training workshops are sponsored annually by the Center. Conference *Proceedings* and statistical reports are published by the University Presses of Florida. For information write the Director, Center for Gerontological Studies, College of Liberal Arts and Sciences.

HEALTH SYSTEMS RESEARCH DIVISION

The Division is an interdisciplinary activity organized within the Office of the Vice President for Health Affairs, J. Hillis Miller Health Center. Its function is to conduct research to improve the effectiveness and efficiency of the health services delivery system and of the health manpower education and training system and to develop methods for the optimal allocation of health care resources. Research projects are carried out for the academic units of the health center, the Shands Teaching Hospital and Clinics, and other health care facilities within the University and community. In addition, research is conducted through contracts and grants for health organizations and agencies at the state and national level.

The staff of the Division consists of faculty, students, and career service employees representing a diversity of backgrounds and disciplines. Among these

are operations research, industrial and systems engineering, health and hospital administration, computer science, economics, medicine, dentistry, and health related professions. Student support is provided through assistantships and fellowships. For information, write the Director, Health Systems Research Division, Box J-177, J. Hillis Miller Health Center.

CENTER FOR INFORMATION RESEARCH

The Center (CIR) is responsible for directing, coordinating, and conducting advanced study and research activity in computers, information systems, software engineering, and their applications to multiple disciplines. As an interdisciplinary center, CIR creates a stimulating environment for basic and applied research to seek new insights in, and optimal solutions to, engineering, physical, biological, medical, management, environmental, and social problems. The Center's staff is concerned with solving problems in various disciplines by using modern computing machines, recent communication sciences, and the latest information technology.

The primary functions of CIR are (1) to conduct research in developing the theory and techniques for the design of computer systems and software for solving problems of our society; (2) to develop advanced technology for the design of new information systems for various disciplines; (3) to provide coordination and initiation of interdisciplinary attack on the complex techno-socioeconomic, environmental, and health problems by the systems approach; (4) to provide internship opportunities for graduate students in information science and related areas; and (5) to assist industry and government in finding practical and efficient solutions to information-processing problems.

The research laboratories are equipped with a PDP 11/40 computer system, an Optronics P-1000 precision drum scanner, a Graphic 1 interactive computer graphics system, a pictorial data acquisition computer (PIDAC), a PDP-5 computer, and a DIVA mass storage system. In addition, the Center maintains a large software library representing many years of research and applications in the areas of pattern recognition, image processing, and information retrieval. In particular, the library possesses Telebrowsing, a Center-developed intelligent information retrieval system, as well as numerous image processing packages which may be applied to specific problems with a minimum software development effort.

The Center sponsors the International Symposia on Computer and Information Science (COINS Symposia), cooperates with other University units in organizing and conducting conferences, seminars, short courses, and developmental programs in information science, and supports publication of scholarly books, monograph series, and an international journal on computer and information science.

Graduate student support is provided through research assistantships at all levels of graduate study. Inquiries about the various programs and activities of the CIR should be addressed to the Director, Center for Information Research, 339 Larsen Hall.

CENTER FOR NEUROBIOLOGICAL SCIENCES

The purpose of the Center is to promote intellectual interchange and scientific collaboration among faculty and students interested in the nervous system. A training grant supports students specifically involved in the investigation of brain-behavior relationships. The training program is conducted through formal courses, seminars, symposia and participation in laboratory research. Trainees are affiliated with the Center through a basic science or clinical department. For information, write the Director, Center for Neurobiological Sciences, Box J-224, J. Hillis Miller Health Center.

PUBLIC ADMINISTRATION CLEARING SERVICES

The Clearing Service is a research and service adjunct of the Department of Political Science in the College of Liberal Arts and Sciences. It carries on a continuous program of research in public administration, political behavior, and public policy in Florida; publishes research studies and surveys of administrative and political problems in both scientific and popular monograph form; and publishes a *Civic Information Series* annually for assistance to citizen groups in their study of current issues in the state. For information, write the Director, Public Administration Clearing Services, 3326 General Purpose Building A.

CENTER FOR RESEARCH ON HUMAN PROSTHESIS

The Center fosters interchange between the biomedical and engineering sciences in research on the development of prosthetic devices for neurosensory organs and limbs, particularly for visual prosthesis. For information, wirte the Director, Center for Research on Human Prosthesis, Box J-284, J. Hillis Miller Health Center.

CENTER FOR SENSORY STUDIES

Sensory studies deal with those systems which provide an organism with information about its internal or external environment. Traditionally, these topics range from vision and hearing to biological clocks and homing activity. Sensory studies at the University of Florida provide a special opportunity to the talented student because of the unusual convergence of a strong faculty, a set of unique facilities which are available within the University and which are peculiar to the State of Florida and its regional location in the United States.

The graduate program envisioned by the faculty calls for broad training in an established academic discipline (psychology, physiology, etc.), an introductory survey of the senses, in-depth training in one or more sense modalities (vision, hearing, chemical, etc.) and special advanced studies in basic or applied techniques. The intent is to develop a broad perspective as well as necessary skills within an established academic discipline. This provides the foundation upon which sensory studies will be developed. Affiliation with an academic degree granting program will also provide an additional basis for future professional affiliation. Since students will enter the sensory program with differing backgrounds, the program of studies will be tailored to the perceived needs of the student.

Correspondence concerning admission to the Sensory Studies Program should be directed to the Direc-

tor, Center for Sensory Studies, Box J-284, J. Hillis Miller Health Center.

URBAN AND REGIONAL RESEARCH CENTER

The Center stimulates and coordinates interdisciplinary research on urban and regional affairs and works closely with faculty and graduate students in any discipline concerned with local, state, regional, national, or international human settlements. Since the major thrust of URRC is research, no formal courses or degree programs are offered. However, URRC seeks the participation of faculty and graduate students who are interested in research on urban and regional topics. The Center maintains an updated listing of grant announcements and is ready to assist in the development of research proposals. Further inquiries should be made to the Director, Urban and Regional Research Center, 2326 General Purpose Building A.

FLORIDA WATER RESOURCES RESEARCH CENTER

The Center, funded by the Department of the Interior, was established in 1964 as a result of the passage of P. L. 88-379—The Water Resources Research Act of 1964—"to stimulate, sponsor, provide for, and supplement present programs for conduct of research, investigation, experiments, and the training of scientists in the fields of water and of resources which affect water."

Under the administration of the Center, current water research projects pertaining to the achievement of adequate statewide water resource management, and water quality and quantity are being conducted by staff members in various departments at the University of Florida and at four other colleges and universities in the state. For information, write the Director, Florida Water Resources Research Center, 424 A. P. Black Hall.

CENTER FOR WETLANDS

The Center for Wetlands is an intercollege research division dedicated to wetlands, their ecology, problems, management, and effective land use. The Center advances knowledge through special research approaches as systems ecological modelling and simulation, energy cost benefit analysis and planning, field experiments on vegetation response to water control and regional planning.

The Center fosters campus and statewide communication through a central workshop activity, organized research projects of county and state concern, wetlands publications, conferences and short courses, research data collections, and proposals for curricula. Support of faculty and graduate students is provided by active projects. The Center is jointly sponsored by the Colleges of Engineering, Liberal Arts and Sciences, Agriculture, and Architecture.

Representative research projects are "Cypress Wetlands for Water Management, Recycling, and Conservation," funded by The Rockefeller Foundation and the RANN Division of National Science Foundation. Work of the Center includes a section on energy analysis, evaluating environmental alternatives with data on energy flows.

Interested persons should contact the Director, Center for Wetlands, Phelps Lab.

STUDENT SERVICES

CAREER RESOURCE CENTER

The Center, Suite G-22, J. Wayne Reitz Student Union is the central agency for career planning, job placement, and cooperative education assistance for all students and alumni of the University. It also coordinates these activities with those graduate programs that provide direct employment assistance to their students.

Graduate students desiring to orient career interests, formulate job search plans, gain proficiency in job related communications, to interview or otherwise identify and contact potential employers are invited to visit the Center and utilize its services.

For those seeking individual assistance in resolving problems relating to any of the activities of the Center, vocational counselors are available for personal appointments.

The Center provides reproduction and distribution services for the professional files (Qualification Records, Resumes, Vitae, References, and other related papers) of students and alumni. A modest charge is assessed to cover labor and materials for reproduction and mailing of copies of these credentials to employers when so directed by students or alumni.

A significant on-campus job interview program with representatives from business, industry, government, and education seeking graduating students in most career fields is available to all graduate students registered with the Center.

GRAD II is a computerized program matching employers with prospective qualified employees. GRAD II input forms are available at the Center.

Other functions of the Center include (1) serving as liaison between students and employers; (2) conducting studies on the employment outlook, salary trends, progress of graduates in the working world and related matters; (3) serving in a public relations capacity in dealing with employers and the public; and (4) providing speakers from business, industry, government, education, and the Center to academic classes and student organizations to talk on professional subjects of interest.

EDITORIAL ASSISTANCE AND INFORMATION

The Graduate School Editorial Office provides a *Guide for Preparing Theses and Dissertations* to assist the student in the preparation of the manuscript and offers suggestions and advice on such matters as the preparation and reproduction of illustrative materials, the treatment of special problems, the use of copyrighted material, and how to secure copyright for a dissertation. The following procedures apply to the Graduate School's editorial services to students.

1. The responsibility for acceptable English in a thesis or dissertation, as well as the originality and acceptable quality of the content, lies with the student and the supervisory committee.

2. The Graduate School editorial staff acts only in an advisory capacity but will answer questions regarding correct grammar, sentence structure, and acceptable forms of presentation.

3. If the student will bring his final rough draft to the Editorial Office of the Graduate School, the staff will examine a limited portion and make recommen-

dations concerning the form of the thesis or dissertation before the final typing.

4. After the first submission of the dissertation in final form, the Editorial Office staff checks the format, paper stock, and pagination and reads portions of the text for general usage, references, and bibliographical form. Master's theses are checked for paper stock, format, reference style, and pagination.

5. Upon final submission, the signature pages and Final Examination forms for all theses and dissertations are checked against the Admission to Candidacy forms for the signatures of the college dean (except for the Colleges of Liberal Arts & Sciences, Business Administration, and Education *which require a special statement on the signature page*) and all members of the supervisory committee.

It is the responsibility of the student and the supervisory chairman to notify the Graduate School in writing of any changes which have been made in the structure of the supervisory committee.

6. The Editorial Office maintains a file of experienced thesis typists, manuscript editors, and draftsmen which the student may examine to find assistance in the mechanical preparation of the manuscript.

ADVISER TO FOREIGN STUDENTS

The office of the adviser is the center for services performed in behalf of foreign students from their initial inquiries until their return home. The office coordinates with other University agencies and is charged with responsibilities involving admissions, reception, orientation, housing finances, health, immigration, academic counseling, petitions, practical training, employment, embassy and foundation reports, correspondence, legal problems, life counseling, and community relations. The adviser also assists foreign faculty members.

STUDENT HEALTH SERVICE

The Student Health Service provides a spectrum of medical services which includes primary medical care, health education, health screening programs, and mental health consultation and counseling.

The service consists of an out-patient clinic and a 14-bed in-patient unit staffed by physicians, physician's assistants, nurses, psychologists, pharmacists, laboratory and x-ray technicians, and supporting personnel. It is housed in the Infirmary, which is centrally located on the campus.

The Service is a unit of the J. Hillis Miller Health Center with its Colleges of Medicine, Nursing, and Health Related Professions. The facilities of the Health Center are available by consultation and referral through the Student Health Service. Specialty clinics are available in the Infirmary for allergy, minor surgery, orthopedics, mental health, and women's health care.

The health fee is part of the tuition fee paid by all full-time students. Part-time students have the option of paying the health fee which would entitle them to the same use of the Service as a full time student. The health fee covers ordinary out-patient visits and some laboratory tests. When more complicated diagnostic studies or hospitalization is required, additional charges are made. For this reason, the supplemental student government health insurance plan is highly recommended.

A personal health history questionnaire completed by the student is required before registration at the University.

SPEECH AND HEARING CLINIC

The Clinic, Room 442, Arts and Sciences Building, offers services without charge to any Universty student who has a speech or hearing disorder. This assistance is available at any time during the year and therapy sessions are adjusted to individual schedules. The student is encouraged to visit the Clinic and to use this service.

UNIVERSITY COUNSELING CENTER

The University Counseling Center offers free psychological and vocational counseling to all students of the University and their spouses. The Center is staffed by psychologists whose primary interests are to facilitate the growth and development of individuals in the University setting. Psychological services are available to students experiencing academic, personal, social, or marital difficulties. Vocational services include testing, career information, and counseling. The Center offers consultative services to University faculty and staff who are engaged in advising or counseling students.

Fields of Instruction

FIELDS OF INSTRUCTION COLLEGES AND AREAS OF INSTRUCTION

AGRICULTURE
- Agricultural and Extension Education
- Agronomy
- Animal Science
- Botany
- Dairy Science
- Entomology and Nematology
- Food and Resource Economics
- Food Science and Human Nutrition
- Forest Resources and Conservation, School of
- Horticultural Science
  - Fruit Crops
  - Ornamental Horticulture
  - Vegetable Crops
- Microbiology and Cell Science
- Plant Pathology
- Poultry Science
- Veterinary Medicine—IFAS

ARCHITECTURE
- Architecture
- Building Construction, School of
- Urban and Regional Planning

BUSINESS ADMINISTRATION
- General
- Accounting, School of
- Computer and Information Sciences
- Economics
- Finance and Insurance
- Health and Hospital Administration
- Management
- Marketing
- Real Estate and Urban Analysis

EDUCATION
- Counselor Education
- Curriculum and Instruction, Division of
  - General Teacher Education
  - Instructional Leadership and Support
  - Subject Specialization Teacher Education
- Educational Administration and Supervision
- Foundations of Education
- Special Education

ENGINEERING
- General
- Agricultural Engineering
- Chemical Engineering
- Civil Engineering
- Coastal and Oceanographic Engineering
- Computer and Information Sciences
- Electrical Engineering
- Engineering Sciences
  - Aerospace Engineering
  - Engineering Science and Mechanics
- Environmental Engineering Sciences
- Industrial and Systems Engineering
- Materials Science and Engineering
- Mechanical Engineering
- Nuclear Engineering Sciences

FINE ARTS
- Art
- Music
- Theatre

GERONTOLOGICAL STUDIES, CENTER FOR

HEALTH RELATED PROFESSIONS
- General
- Clinical Psychology
- Communicative Disorders
- Health and Hospital Administration
- Occupational Therapy
- Rehabilitation Counseling

JOURNALISM AND COMMUNICATIONS

LAW
- Taxation

LIBERAL ARTS AND SCIENCES
- General
- Anthropology
- Astronomy
- Botany
- Chemistry
- Classics
  - Latin
- Communicative Disorders
- Computer and Information Sciences
- English
- Geography
- Geology
- Germanic and Slavic Languages and Literatures
- History
- Latin American Studies, Center for
- Linguistics
- Mathematics
- Philosophy
- Physics
- Political Science
- Psychology
- Religion
- Romance Languages and Literatures
  - French
  - Portuguese
  - Spanish
- Sociology
- Speech
- Statistics
- Zoology

MEDICINE—MEDICAL SCIENCES
- General
- Anatomy
- Biochemistry and Molecular Biology
- Immunology and Medical Microbiology
- Neuroscience
- Pathology
- Pharmacology and Therapeutics
- Physiology

NURSING

PHARMACY—PHARMACEUTICAL SCIENCES
- Medicinal Chemistry
- Pharmacy

PHYSICAL EDUCATION, HEALTH, AND RECREATION
- Health Education and Safety
- Professional Physical Education

SCHOOL OF ACCOUNTING
College of Business Administration

GRADUATE FACULTY 1979-80

Director: J. K. Simmons. *Graduate Coordinator:* C. L. McDonald. *Professors:* A. R. Abdel-khalik; L. J. Benninger; D. D. Ray; J. K. Simmons; W. E. Stone; S. C. Yu. *Associate Professors:* I. N. Gleim; G. L. Holstrum; C. L. McDonald; D. H. Patz; E. D. Smith. *Assistant Professors:* W. A. Collins; D. A. T. Snowball.

The School of Accounting offers graduate work leading to the degrees Master of Accounting (M.Acc.) and Ph.D. with a major in business administration and an accounting concentration. The M.Acc. degree program offers specialization in each of the four areas of auditing/financial accounting, management accounting, accounting systems, and taxation. The Ph.D. accounting concentration is designed to prepare students for a career in teaching and research at the university or college level or for research-oriented careers in business and government. Specific details for the M.Acc. and Ph.D. programs will be supplied by the Graduate Coordinator upon request. The degree Master of Business Administration with an accounting concentration is offered by the College of Business Administration. Requirements for the MBA are included in the front section of the *Catalog*.

The M.Acc. and the Ph.D. accounting programs require admission standards of at least the following: For the M.Acc. program, a combined verbal and quantitative score of 1100 on the Graduate Record Examination; a combined Graduate Record Examination score of 1250 for the Ph.D. program; or a score of 500 for the M.Acc. and 550 for the Ph.D. program on the Graduate Management Admission Test (GMAT). Either the GRE or the GMAT scores are acceptable; but admission to the M.Acc. or Ph.D. accounting graduate programs cannot be granted until scores are received. Foreign students must submit a TOEFL test score of at least 500 and a satisfactory GMAT or GRE score.

Admission to graduate courses in accounting requires that students have, or complete without graduate credit, approximately the courses required of an undergraudate accounting major. With this background the M.Acc. degree can normally be earned in four quarters.

The M.Acc. degree requires 54 credits of course work. A minimum of 24 credits must be graduate level accounting courses. The remaining credits are selected from recommended elective courses that vary by area of specialization.

Thesis Option: Requirements include 18-20 quarter hours of graduate accounting courses and the balance of the 36 course credits in one or two minor fields (finance, operations research, management, etc.). A thesis on an accounting-related topic is required. The total number of course and thesis credits required is 45.

Requirements for the Ph.D. degree include a core of courses in operations research, statistics, the behavioral sciences, and economic theory; one or two minor fields selected by the student; and major field of accounting. Students are expected to acquire teaching experience as a part of the Ph.D. degree program. Grants-in-aid will be awarded for this teaching. Students are expected to enroll in ACC 6940 for a maximum of five credits. Fulfillment of a research skill and a dissertation on an accounting-related topic are also required.

ACC 5011—Financial Accounting (5) *May not be taken by students who have completed ACC 2001 and ACC 2301. Designed primarily for MBA candidates and other graduate students. Not open to accounting majors.* Functions and underlying principles of accounting stressed. Emphasis on analysis of financial conditions and business operations through an understanding of accounting statements.

ACC 5214—Advanced Financial Accounting for Complex Organizations (4) Analysis of accounting procedures for consignment and installment sales, partnerships, branches, consolidations, foreign operations and other advanced topics.

ACC 5231—Financial Reporting Standards (4) Special topics in financial accounting and current reporting problems facing the accounting profession. Review of current authoritative pronouncements.

ACC 5512—Federal Income Taxation Procedures and Research (4) Examination of basic tax research as well as the statutory provisions specifying the duties and responsibilities of the IRS and the taxpayers to each other. The topics to be covered include a description of the sources of tax information, the methods of researching tax problems, IRS ruling procedures, tax reporting and collection procedures, and the administrative and judicial procedures governing tax controversies.

ACC 5513—Transactions Between Shareholders and Corporations (4) Examination of the fundamental legal concepts, the statutory provisions and the computational procedures applicable to economic transactions involved in the formation, distributions (including redemptions), partial liquidations, and complete liquidations of corporate entities.

ACC 5531—Federal Estate and Gift Taxation (4) Examination of the federal excise tax levied on transfers of property via gift or from decedents estates.

ACC 5632—Auditing Theory and Internal Control II (4) A continuation of ACC 4602 with detailed coverage of field work procedures for internal control and substantive audit testing, statistical sampling, operational auditing and audit software packages.

ACC 5745—Management Information Systems Theory (4) Examination of systems theory in relation to the accountant's function of providing information for management.

ACC 5751—Administration of the Systems Function (4)

ACC 5846—Advanced Accounting Analysis for the Controllership Function (4) A study of planning and control as they relate to management of organizations. The course draws from cases and journals to integrate managerial accounting concepts.

ACC 5865—Public Administration Accounting (4)

ACC 5870—CPA Examination Review (4) *Consent of instructor required. This course may not count toward fulfilling degree requirements.*

ACC 6290—Accounting Theory (4) Current developments in accounting concepts and principles and their relevance to the status of current accounting practices.

ACC 6411—Cost Accounting Theory and Applications (4)

ACC 6692—Auditing and Financial Accounting Issues and Cases (4) A study of recent and projected future developments in financial reporting and auditing emphasizing cases, journal articles, and pronouncements.

ACC 6739—Management Information Systems Seminar (4)

ACC 6811—Social and Economic Accounting (5)

ACC 6821—Interdisciplinary Considerations in Accounting Theory Development (5) Developments in related disciplines, such as economics, law and behavioral sciences, analyzed for their contribution to accounting thought.

ACC 6831—Accounting and Analytical Methods (5) Utilization of logic, including mathematics, in formulation of alternative accounting valuation models and in clarification of accounting concepts.

ACC 6905—Individual Work in Accounting (1-5; max: 10) *Prereq: approval of Graduate Coordinator.* Reading and research in areas of accounting.

ACC 6910—Supervised Research (1-5)

ACC 6940—Supervised Teaching (1-5)

ACC 6971—Research for Master's Thesis (1-15)

ACC 7292—Accounting Information for External Users (5) Generation of accounting data for nonmanagement eval-

uation and control of processes through which economic resources are administered.
ACC 7395—Accounting Theory as Related to Managerial Decision Making (5) Theoretical framework of accounting related to decision-making processes of management.
ACC 7805—Development of Thought in Accounting Theory (5) Inquiry into criteria for choice among income-determination and asset-valuation rules in context of public reporting.
ACC 7925—Accounting Research Workshop (4; max: 12) In-depth analysis of current research topics in accounting. Paper presentation and critiques by visiting scholars, faculty, and doctoral students.
ACC 7980—Research for Doctoral Dissertation (1-15)

AGRICULTURAL & EXTENSION EDUCATION
College of Agriculture

GRADUATE FACULTY 1979-80
Chairman & Graduate Coordinator: C. E. Beeman. *Professor:* C. E. Beeman. *Assistant Professors:* J. G. Cheek; W. S. Farrington; M. B. McGhee; C. L. Taylor.

The Department of Agricultural and Extension Education offers major work for the degrees of Master of Science and Master of Agriculture. The Master of Science, primarily for those interested in research, requires a thesis while the Master of Agriculture does not (see requirements for master's degrees). The master's program in agricultural and extension education is designed for those persons engaged in teaching agriculture (at all levels) in the public schools of Florida, those in the Cooperative Extension Service, and others in educational and leadership positions in agriculture and/or extension education who desire additional professional training.

A prospective graduate student need not have majored in agricultural and extension education as an undergraduate. However, students with an insufficient background in either agricultural and extension education or technical agriculture will need to include some basic courses in these areas in their program.

AEE 5643—Comparative Extension Education (4) *Prereq: AEE 3313.* A comparative of the various systems of Extension Education on a worldwide basis and the factors affecting the programs and organization within the various systems.
AEE 6206—Advanced Instructional Techniques in Agricultural and Extension Education (4) *Prereq: AEE 3200, 4224.* Effective use of instructional materials and methods in agricultural and extension education. Emphasis on development and application of visual and nonvisual techniques of instruction.
AEE 6300—Methodology of Planned Change (4) Examination of processes by which professional change agents influence the introduction, adoption, and diffusion of technological changes. Applicable to those who work closely with people in bringing about change.
AEE 6325—History and Philosophy of Agricultural Education (4) Historical development of agricultural education from its beginning in other countries to the present program in the United States, with attention to changing philosophies.
AEE 6417—Advanced Agricultural and Extension Leadership (4) Training in leadership opportunities and responsibilities, including small group leadership, program planning, community organization and development, human relationships, public affairs, and public policy.
AEE 6516—Program Development and Evaluation in Extension (4) Fundamental concepts and procedures for effective program development and evaluation in the Cooperative Extension Service.
AEE 6521—Agricultural and Extension Education Through Group Action (4) Advanced techniques in developing programs of agricultural and extension education through group action.
AEE 6523—Planning Community and Rural Development Programs (4) Application of basic principles and practices in planning community and rural development programs.
AEE 6541—Developing Curriculum Materials in Agricultural and Extension Education (4) Development of appropriate curriculum materials in agricultural and extension education.
AEE 6606—Principles and Practices of Extension Education (4) Principles and practices involved in executing extension education programs.
AEE 6611—Agricultural and Extension Adult Education (4) Establishment, organization of classes, use of appropriate teaching procedures and evaluation of programs of agricultural and extension adult education.
AEE 6704—Extension Administration and Supervision (4) Principles and practices for effective administration and supervision of the cooperative extension service program at the county and state levels.
AEE 6905—Problems in Agricultural and Extension Education (1-4; max: 12) For students qualified to select and pursue advanced research problems.
AEE 6910—Supervised Research (1-5)
AEE 6912—Nonthesis Research in Agricultural and Extension Education (1-5; max: 9) Library and workshop related to methods in agricultural and extension education, including study of research work, review of publications, and development of written reports.
AEE 6933—Seminar in Agricultural and Extension Education (1; max: 3)
AEE 6935—Topics in Agricultural and Extension Education (1-4) Special topics on selected aspects of agricultural education and/or extension education.
AEE 6940—Supervised Teaching (1-5)
AEE 6946—Supervised Occupational Experiences in Agricultural Education (4) Basic problems in planning and supervising programs of occupational experiences in view of changes occurring in agricultural occupations.
AEE 6971—Research for Master's Thesis (1-15)

AGRICULTURAL ENGINEERING
College of Engineering

GRADUATE FACULTY 1979-80
Chairman: G. L. Zachariah. *Graduate Coordinator:* R. C. Fluck. *Professors:* R. E. Choate; R. C. Fluck; D. S. Harrison; J. M. Myers; A. R. Overman; C. J. Rogers; L. N. Shaw; T. C. Skinner; J. D. Whitney; G. L. Zachariah. *Associate Professors:* L. O. Bagnall; C. D. Baird; D. E. Buffington; K. L. Campbell; J. W. Jones; C. F. Kiker; J. W. Mishoe; R. A. Nordstedt; S. F. Shih; G. H. Smerage. *Assistant Professors:* A. B. Bottcher; K. V. Chau; J. J. Gaffney; D. G. Haile; W. M. Miller; A. G. Smajstrla; F. C. Wang.

The degrees Master of Science, Master of Engineering, and Engineer are offered students with graduate programs in agricultural engineering.

The Master of Science and Master of Engineering degrees are offered in the following areas of research: soil and water conservation engineering, waste management, power and machinery, structures and environment, and electric power and processing. The Master of Science degree is also offered in the area of mechanized agriculture. Through a cooperative program jointly administered with the Department of Food Science and Human Nutrition, a student can pursue a graduate program in food engineering.

A student with a degree in a related field may enter the graduate program if adequate articulation courses are included in his program. A normal master's program may be completed in five or six quarters. Stu-

dents interested in graduate work in agricultural engineering should consult departmental advisers.

Candidates for an engineering master's degree are normally required to take AGE 6931, 6986, 6031, and at least one of the following: AGE 6252, 6152, 6332, 6442, and 6933. Other course work is taken in applicable basic and applied sciences to meet educational objectives and to comprise an integrated program as approved by the student's supervisory committee. Courses from other disciplines may be approved for graduate major credit.

Prerequisite for admission to any agricultural engineering graduate course is the approval of the instructor.

AGE 5643C—Biological and Agricultural Systems Analysis (4) *Prereq: MAC 3312.* Conceptual and mathematical modeling; concepts and analysis of system behavior; physiological, populational, and agricultural applications.
AGE 5646C—Biological and Agricultural Systems Simulation (4) *Prereq: MAC 3312, COP 3110 or 3212.* Digital computer simulation of mathematical models of biological and agricultural systems; CSMP and GASP IV languages.
AGE 6031—Instrumentation in Agricultural Engineering Research (4) Principles and application of measuring instruments and devices for obtaining experimental data in agricultural engineering research.
AGE 6152—Advanced Farm Machinery (4) Machines and mechanized systems used in agriculture and related fields, with emphasis on functional design requirements, design procedures, and performance evaluation.
AGE 6252—Advanced Soil and Water Management Engineering (4) Physical and mathematical analysis of problems in infiltration, drainage, and groundwater hydraulics.
AGE 6332—Advanced Agricultural Structures (4) Design criteria for agricultural structures including structural strength, steady and unsteady heat transfer analysis, environmental modification, plant and animal environment physiology, and structural systems analysis.
AGE 6442—Advanced Agricultural Process Engineering (4) Engineering problems in handling and processing agricultural products.
AGE 6905—Nonthesis Research in Agricultural Engineering (1-5; max: 10) Special problems in agricultural engineering.
AGE 6910—Supervised Research (1-5)
AGE 6931—Seminar (1) Discussions of research, current trends, and practices in agricultural engineering. S/U.
AGE 6933—Special Topics in Agricultural Engineering (1-6; max: 10) Lectures, laboratory and/or special projects covering special topics in agricultural engineering.
AGE 6940—Supervised Teaching (1-5)
AGE 6971—Research for Master's Thesis (1-15)
AGE 6986—Research Methods in Agricultural Engineering (3) Approaches to scientific research, scientific method, design of experiments, research practices and techniques, and presentation of results.

AGRONOMY
College of Agriculture

GRADUATE FACULTY 1979-80

Chairman: C. E. Dean. *Graduate Coordinator:* E. G. Rodgers. *Professors:* C. E. Dean; W. G. Duncan; J. R. Edwardson; W. B. Ennis, Jr.; M. H. Gaskins; R. E. Goddard; V. E. Green, Jr.; K. Hinson; E. S. Horner; A. E. Kretschmer, Jr.; D. E. McCloud; G. O. Mott; A. J. Norden; P. L. Pfahler; H. L. Popenoe; G. M. Prine; E. G. Rodgers; O. C. Ruelke; S. C. Schank; R. L. Smith; S. H. West; E. B. Whitty; M. Wilcox. *Associate Professors:* R. D. Barnett; W. L. Currey; A. E. Dudeck; L. S. Dunavin; G. J. Fritz; R. N. Gallaher; L. A. Garrard; G. J. Gascho; D. W. Gorbet; W. T. Haller; C. A. Hollis III; J. T. Johnson; F. le Grand; P. Mislevy III; V. N. Schroder; D. L. Sutton. *Assistant Professors:* L. H. Allen, Jr.; K. J. Boote; B. J. Brecke; J. B. Brolmann; R. S. Kalmbacher; G. Kidder; W. R. Ocumpaugh; K. H. Quesenberry; D. H. Teem; D. L. Wright.

The Department of Agronomy offers the Doctor of Philosophy and the Master of Science degrees with specialization in crop ecology, crop nutrition and physiology, crop production, weed science, genetics, cytogenetics, or plant breeding. Specializations for the Doctor of Philosophy degree also include forest genetics and physiology. A nonthesis degree, Master of Agriculture, is offered with a major in agronomy.

Graduate programs emphasize the development and subsequent application of basic principles in each specialization to agronomic plants in Florida and throughout the tropics. The continuing need for increased food supplies is reflected in departmental research efforts. When compatible with a student's program and permitted by prevailing circumstances, some thesis and dissertation research may be conducted wholly or in part in one or more of several tropical countries.

A science background with basic courses in mathematics, chemistry, botany, microbiology, and physics is required of new graduate students. In addition to graduate courses in agronomy, the following courses in related areas are acceptable for graduate credit as part of the student's major: ANS 6368—Quantitative Genetics; ANS 6388—Genetics of Animal Improvement; ANS 6715—Ruminant Physiology and Metabolism; BOT 6566—Plant Growth and Development; BOT 6646—Ecology of Aquatic Plants; HOS 6231—Biochemical Genetics of Higher Plants; HOS 6611—Agricultural Meteorology; HOS 6631—Environmental Measurements; PCB 6307—Limnology; PCB 6356—Ecosystems of the Tropics; PLS 5652—Herbicide Technology; PLS 6623—Weed Ecology; SOS 6136—Soil Fertility; STA 6168—Advanced Methods of Statistics.

AGR 6233—Tropical Pasture and Forage Science (5) *Prereq: AGR 4231 and ANS 5446, or consent of instructor.* Potential of natural grasslands of tropical and subtropical regions. Development of improved pastures and forages and their utilization in livestock production.
AGR 6237—Agronomic Methods of Forage Evaluation (4) *Prereq or coreq: STA 6168.* Experimental techniques for field evaluation of forage plants. Design of grazing trials and procedures for estimating yield and botanical composition in the grazed and ungrazed pasture.
AGR 6249—Crop Plants in Tropical Environments (12) *Prereq: approval by Organization for Tropical Studies.* Factors determining growth, development, and production of crop plants in tropical environments.
AGR 6307—Advanced Genetics (4) *Prereq: AGR 3033, AGR 4321, or ASG 3313.* Advanced genetic concepts and modern genetic theory.
AGR 6311—Population Genetics (3) *Prereq: AGR 3033, STA 6166.* Application of statistical principles to biological populations in relation to gene frequency, zygotic frequency, mating systems, and the effects of selection, mutation, and migration on equilibrium populations.
AGR 6323—Advanced Plant Breeding (4) *Prereq: AGR 3210, AGR 4321, AGR 6311, and STA 6167.* Genetic basis for plant-breeding procedures.
AGR 6353—Cytogenetics (5) *Prereq: basic courses in genetics and cytology.* Genetic variability with emphasis on interrelationships of cytologic and genetic concepts. Chromosome structure and number, chromosomal aberrations, apomixis, and application of cytogenetic principles.
AGR 6380—Genetics Seminar (1; max: 3) Current literature and developments in genetics.
AGR 6390—Topics in Genetics (2-4; max: 12) *Prereq: AGR 3303 or PCB 3060C.* Biochemical, bacterial, viral, statistical, radiation, serological, and human genetics; speciation, history of genetics, genetics of higher plants and animals.

AGR 6422—Crop Nutrition (4) *Prereq: BOT 3503C.* Nutritional influences on differentiation, composition, growth, and yield of agronomic plants.
AGR 6442—Physiology of Agronomic Plants (4) *Prereq: BOT 5505C.* Yield potentials of crops as influenced by photosynthetic efficiencies, respiration, translocation, drought, and canopy architecture.
AGR 6511—Crop Ecology (5) *Prereq: AGR 3210, BOT 3503C, PCB 3033C or equivalent.* Relationships of ecological factors and climatic classification to agroecosystems, and crop modeling of the major crops.
AGR 6661C—Sugarcane Processing Technology (4) *Prereq: CHM 3200, 3200L.* Chemical and physical processes required for crystallization and refining of sugar.
AGR 6751—Biochemistry of Herbicides (3) *Prereq: CHM 5235.* Metabolism, mechanism of action, and structure-activity relationships of herbicides.
AGR 6905—Agronomic Problems (1-6; max: 12) *Prereq: minimum of one undergraduate course in agronomy or plant science.* Special topics for classroom, library, laboratory or field studies of agronomic plants.
AGR 6910—Supervised Research (1-5)
AGR 6932—Topics in Agronomy (2-4; max: 12) Critical review of selected topics in specific agronomic areas.
AGR 6933—Graduate Agronomy Seminar (1; max: 3) *Required of all graduate students in agronomy.* Current literature and agronomic developments.
AGR 6940—Supervised Teaching (1-5)
AGR 6971—Research for Master's Thesis (1-15)
AGR 7980—Research for Doctoral Dissertation (1-15)
PLS 5652—Herbicide Technology (4) *Prereq: CHM 3200, PLS 4601, or consent of the instructor.* Classification, mode of action, principles of selectivity, and plant responses to herbicides. Weed, crop, environmental, and pest management associations in developing herbicide programs.
PLS 6623—Weed Ecology (3) *Prereq: PCB 3033C and PLS 4601 or equivalent.* Environmental influences on behavior and control of weeds; influences of common methods of weed control on the environment.

ANATOMY
College of Medicine

GRADUATE FACULTY 1979-80

Chairman: M. H. Ross. *Graduate Coordinator:* T. G. Hollinger. *Professors:* C. M. Feldherr; M. H. Ross. *Associate Professors:* E. Kallenbach; L. H. Larkin. *Assistant Professors:* T. G. Hollinger; M. G. O'Rand; L. J. Romrell; K. E. Selman.

The Department of Anatomy offers programs leading to the Doctor of Philosophy degree in medical sciences and, in special cases, the Master of Science degree. Areas of research and training in anatomy include cell biology, developmental and reproductive biology, and mammalian morphology.

Applicants should have a strong background in biology and have taken undergraduate courses in inorganic chemistry, organic chemistry, calculus, and physics. Deficiencies can be made up during the first year of graduate study.

BMS 5100C—Gross Anatomy (9)
BMS 5110—Microscopic Anatomy (6)
BMS 5168C—Applied Gross Anatomy (7)
BMS 6105—Advanced Gross Anatomy (3-6; max: 9) Regional and specialized anatomy of the human body taught by laboratory dissection, conferences, and demonstrations.
BMS 6120C—Embryology and Organogenesis (4) *Prereq: ZOO 3703 or BMS 5100C.* Human and higher mammalian development, physiological and clinical considerations stressed where pertinent.
BMS 6150—Anatomy Seminar (1-3)
BMS 6166—Advanced Microscopic Anatomy (4-6; max: 9) *Prereq: BMS 5110 or ZOO 5755.* Histological approaches and techniques relevant to selected research areas. Lectures, microscopic study, and laboratory project relating structural and functional aspects of problem.
BMS 6173—Submicroscopic Anatomy (4) *Prereq: histology or cytology; approval of staff.* Ultrastructure in cells and tissues of vertebrate forms. Current research trends and functional connotations where pertinent.
BMS 6175—Research Methods in Anatomy (1-6; max: 12) Research techniques of histochemistry, radiation biology, experimental embryology, teratology, endocrinology, or electron microscopy under supervision of staff member.
BMS 6176—Special Topics in Anatomy (1-6; max: 15) Readings in recent research literature of anatomy and allied disciplines.
BMS 6182C—Techniques in Electron Microscopy (3-5) *Prereq: courses and/or experience in histology and cytology.* Theory and practice of electron microscopic techniques including tissue preparation, sectioning, use of the electron microscope, and photography. Offered in even-numbered years.
BMS 6185—Fertilization and Gametogenesis (3) *Prereq: BCH 4313 and 4203 or equivalent; a general course in developmental biology or embryology.* Supervised study of publications in specific areas of reproductive biology, including oogenesis, spermatogenesis, fertilization, and immuno-reproduction. Weekly conferences, reports, and lectures.
BMS 6905C—Individual Study (1-4; max: 12) Supervised study in areas not covered by other graduate courses.
BMS 7643—Membrane Biology (3) Examination of structure, composition, and turnover of plasma and intracellular membranes; consideration of topics relating to membrane function, including pinocytosis, regulation of intracellular exchange, cell recognition, cell communication, and virus formation.
GMS 6971—Research for Master's Thesis (1-15)
GMS 7980—Research for Doctoral Dissertation (1-15)

ANIMAL SCIENCE
College of Agriculture

GRADUATE FACULTY 1979-80

Chairman: H. D. Wallace. *Graduate Coordinator:* G. E. Combs, Jr. *Professors:* C. B. Ammerman; L. R. Arrington; F. S. Baker; F. W. Bazer; J. E. Bertrand; E. L. Besch; R. E. Bradley, Sr; C. B. Browning; P. T. Cardeilhac; J. W. Carpenter; H. L. Chapman, Jr.; G. E. Combs, Jr.; J. H. Conrad; G. K. Davis; M. Drost; K. L. Durrance; G. T. Edds; J. P. Feaster; J. L. Fry; R. R. Gronwall; R. H. Harms; H. H. Head; J. F. Hentges, Jr.; J. A. Himes; R. F. Kahrs; M. Koger; P. E. Loggins; S. P. Marshall; J. E. Moore; A. Z. Palmer; R. L. Shirley; C. F. Simpson; W. W. Thatcher; H. H. Van Horn, Jr.; D. L. Wakeman; H. D. Wallace; A. C. Warnick; F. W. White; C. J. Wilcox; H. R. Wilson; J. M. Wing. *Associate Professors:* R. L. Asquith; C. D. Chen; B. H. Crawford; J. R. Crockett; B. L. Damron; C. R. Douglas; D. J. Forrester; D. D. Hargrove; L. R. McDowell; J. T. Neilson; W. P. Palmore; F.M. Pate; E. A. Ott; R. S. Sand; D. C. Sharp, III; K. L. Smith; R. L. West. *Assistant Professors:* R. J. Collier; J. L. Copelin; J. F. Easley; M. J. Fields; D. M. Janky; A. F. Jilek; S. Lieb; T. A. Olson; M. F. Richter; C. E. White.

The Department of Animal Science offers the degrees of Master of Agriculture, Master of Science, and Doctor of Philosophy in the following areas: (1) animal nutrition, (2) meats, (3) animal breeding and genetics, and (4) animal physiology. A student may work on a problem covering more than one area of study. Large animals (beef cattle, dairy cattle, swine, poultry, and sheep) and laboratory animals are available for various research problems. Adequate nutrition and meats laboratories are available for detailed chemical and carcass quality evaluations. Special arrangements can be made to conduct research prob-

lems at the various branch agricultural experiment stations throughout Florida. A Ph.D. degree may be obtained in animal science, with dissertation research under the direction of members of the Departments of Dairy Science, Poultry Science, and Animal Science, and College of Veterinary Medicine.

Departmental prerequisites for admission to graduate study include a sound science background, with basic courses in bacteriology, biology, mathematics, botany, and chemistry.

The following courses in related areas will be acceptable for graduate credit as part of the candidate's major: AGR 6233—Tropical Pastures and Forage Science; AGR 6307—Advanced Genetics; AGR 6311—Population Genetics; AGR 6353—Cytogenetics; AGR 6380—Genetics Seminar; DAS 6212—Advanced Dairy Cattle Management; DAS 6281—Dairy Science Research Techniques; DAS 6322—Introduction to Statistical Genetics; DAS 6512—Advanced Physiology of Lactation; DAS 6531—Endocrinology; DAS 6541—Energy Metabolism; FOS 6226—Advanced Food Microbiology; FOS 6315—Food Chemistry; PCB 5545—Physiological Genetics; PCB 6577—Ecological Genetics; PSE 6415—Advanced Poultry Nutrition; PSE 6522—Avian Physiology; VES 6242C—Veterinary Physiology I; VES 6243C—Veterinary Physiology II.

ANS 5446—Animal Nutrition (5) *Prereq: ASG 3403, 3404, BCH 3023 or permission of instructor.* Carbohydrates, fats, proteins, minerals and vitamins and their function in the animal body.

ANS 6288—Experimental Technics and Analytical Procedures in Meat Research (4) Experimental design, analytical procedures; technics; carcass measurements and analyses as related to livestock production and meat studies.

ANS 6368—Quantitative Genetics (5) *Prereq: STA 6166.* Genetic and biometric principles underlying genetic characters that exhibit continuous variation.

ANS 6388—Genetics of Animal Improvement (4) *Prereq: ANS 6368.* Continuation of ANS 6368. Application of statistical techniques and design in animal breeding research.

ANS 6448—Nitrogen and Energy in Animal Nutrition (4) *Prereq: CHM 3210.* Utilization of dietary nitrogen and energy sources by ruminants with comparative information on other species.

ANS 6458—Advanced Methods in Nutrition Technology (4) *Prereq: CHM 2043.* For graduate students but open to seniors by special permission. Demonstrations and limited performance of procedures used in nutrition research.

ANS 6472—Vitamins (4) *Prereq: organic chemistry.* Historical development, properties, assays, and physiological effects.

ANS 6636—Meat Technology (4) Chemistry, physics, histology, bacteriology, and engineering involved in the handling, processing, manufacturing, preservation, storage, distribution, and utilization of meat.

ANS 6711—Equine Nutrition and Physiology (4) *Prereq: ANS 5446.* Principles affecting absorption and assimilation of nutrients and basic physiology of growth, reproduction, and exercise of the horse.

ANS 6715—Ruminant Nutrition and Digestive Physiology (3) *Prereq: ANS 5446.* Review and correlation of the fundamental biochemical, physiological, and bacteriological research upon which the feeding of ruminants is based. Experimental methodology of rumen physiology and metabolism.

ANS 6721—Non-Ruminant Metabolism (3) *Prereq: ANS 5446.* Basic principles affecting absorption and assimilation of nutrients required for growth, reproduction, and lactation of swine and small laboratory animals.

ANS 6723—Mineral Nutrition and Metabolism (4) Physiological effect of macro- and microelements, mineral interrelationships.

ANS 6751—Physiology of Reproduction (5) *Prereq: VES 6242, 6243, ASG 4334.* The interactions between the hypothalamus, pituitary gland and reproductive organs during the estrous cycle and pregnancy in the female and sperm production in the male. Embryonic and placental development from fertilization through parturition and factors affecting reproductive efficiency.

ANS 6905—Problems in Animal Science (1-6; max: 12)

ANS 6910—Supervised Research (1-5)

ANS 6932—Topics in Animal Science (4) New developments in animal nutrition and livestock feeding, animal genetics, animal physiology, and livestock management.

ANS 6933—Graduate Seminar in Animal Science (1)

ANS 6940—Supervised Teaching (1-5)

ANS 6971—Research for Master's Thesis (1-15)

ANS 7980—Research for Doctoral Dissertation (1-15)

ANIMAL SCIENCE—GENERAL
College of Agriculture

The Departments of Animal, Poultry, and Dairy Science have combined their curricula into an animal science curriculum. ASG 5221 is a cross-departmental course taught by the faculty of the three departments.

ASG 5221—Animal Production in the Tropics (4) *Prereq: ANS 4244, 4264, DAS 3211 or permission of instructor.* Management and environment factors which affect animal production in the tropics.

ANTHROPOLOGY
College of Liberal Arts and Sciences

GRADUATE FACULTY 1979-80

Chairperson: H. R. Bernard. *Graduate Coordinator:* P. Magnarella. *Graduate Research Professors:* S. Kimball; C. Wagley. *Distinguished Service Professor:* C. H. Fairbanks. *Professors:* H. R. Bernard; E. A. Cook;* P. L. Doughty; B. M. duToit; E. M. Eddy; M. J. Hardman-de-Bautista; P. Magnarella; W. R. Maples; N. N. Markel; J. A. Paredes;* W. H. Sears;† O. von Mering; G. Weiss;† E. S. Wing. *Associate Professors:* K. A. Deagan;* M. C. Dougherty; J. D. Early;† B. T. Grindal;* T. Ho;* R. A. Lawless; M. L. Margolis; J. T. Milanich; T. A. Nunez, Jr.; A. R. Oliver-Smith; B. A. Purdy; A. Spring; J. W. Stoutamire;* S. J. Wilkerson. *Assistant Professors:* A. F. Burns; D. G. Gantt;* W. J. Kennedy;† L. S. Lieberman; G. M. Milton;* M. E. Pohl;* P. M. Rice; C. E. Taylor.

These members of the faculty of the Florida State University (*) and Florida Atlantic University (†) are also members of the graduate faculty of the University of Florida and participate in the doctoral degree program in the University of Florida Department of Anthropology.

Graduate work leading to the Master of Arts (thesis or nonthesis option), Master of Arts in Teaching, and the Doctor of Philosophy degrees is offered in social and cultural anthropology, archeology, physical anthropology, anthropological linguistics and applied anthropology.

Departmental faculty members have particular specialization and experience in Latin American and African area studies, urban and regional planning, peasantries, southeastern U.S. and Caribbean archeology and ethnohistory, historical archeology, anthropology and education, health, agriculture, and applied studies of social and cultural change and development.

Individual programs composed from these areas prepare students for careers in teaching, research, and community and governmental service. In cooperation with the Department of Urban and Regional Planning, the Center for Latin American Studies, the Center for African Studies, the Center for Tropical Agricul-

ture, the J. Hillis Miller Health Center, and the College of Education, the department offers specialized preparation for academic and nonacademic careers in urban affairs, the health related professions, education, community development, and international programs.

The Master of Arts degree with thesis program provides the student with training in all subfields of anthropology. Normal distribution of work includes: (1) ANT 6917; (2) A minimum of one theory course each in social/cultural anthropology, physical anthropology, archeology, and linguistics; (3) Written departmental comprehensive examination in the subfields of anthropology; (4) Satisfactory completion of a thesis based on library or field research. The thesis normally requires no more than one full quarter to complete.

The Master of Arts in Teaching is designed for students intending to teach in junior or four year colleges. The required distribution of work leading to this degree includes: (1) ANT 6917; (2) Satisfactory completion of at least 54 graduate quarter credit hours. These hours must include at least nine credits in a departmental internship in teaching and eight credits in a minor. At least three courses (which may be used as the minor) are required in educational psychology, sociology, and curriculum dealing with the junior college; (3) Written departmental comprehensive examination in the subfields of anthropology and in the minor field.

The Master of Arts degree with nonthesis option prepares students for nonacademic positions in business and education, and in public and private service agencies where anthropological training in combination with other skills will be of practical use. Students entering the program must have a general understanding of the perspectives and concepts of the various subfields within anthropology. The general requirements for this degree include: (1) ANT 6917; (2) Satisfactory completion of 60 graduate quarter hours, of which six credits may be earned for the supervised internship course; (3) Comprehensive examination, either oral or written or both, in the student's field of concentration and minor if any; (4) Completion of supervised internship, equivalent to a minimum of one-quarter duration, working with some public or private agency or on some appropriate project in the area of specialization. Students must submit an acceptable interpretive report based on the work experience at the end of the intern period.

A foreign language may be required in any master's degree program when the supervisory committee considers either a reading or a functional knowledge to be an appropriate professional skill in the student's field of interest.

The master's degree normally requires a minimum of three to four quarters of fulltime course work in residence, depending upon the program selected.

Students are admitted to a doctoral program upon faculty recommendation after completing the master's comprehensive examinations. New intermediate-level students (more than one year of graduate work) coming from other universities will be evaluated by a faculty committee at the beginning of their period of residence. A doctoral student must work closely with a supervisory committee, which gives advice on the choice of fields of specialization, around which further course work, reading, qualifying examinations, and doctoral research are arranged. The student must satisfy the language requirement and pass a written and oral qualifying examination administered by the supervisory committee. Ordinarily, at least a year of doctoral research and field work is required to produce a satisfactory dissertation.

Study for the Ph.D. degree in anthropology at the University of Florida by qualified master's degree recipients at Florida Atlantic University and Florida State University is facilitated by a cooperative arrangement in which appropriate members of these universities are members of the graduate faculty of the University of Florida.

Nonanthropology majors are requested to secure permission from the course instructor before enrolling in graduate level courses.

ANT 5165—Introduction to Mesoamerican Prehistory (4) The origins and growth of civilization in Middle America from ancient times to sixteenth century European contact. Emphasis is placed on ecological factors influencing both culture tradition and regionality, culture process, and institutional interrelationships. Source material is stressed.

ANT 5175—Historical Archeology (5) *Prereq: ANT 2141 or ANT 3142 or ANT 3144, or consent of instructor.* An examination of the methods and theoretical foundations of historical archeology as it relates to the disciplines of anthropology, history, historic preservation and conservation. Will also serve as an introduction to pertinent aspects of material culture during the historic period.

ANT 5195—Zooarchaeology (5) *Prereq: consent of instructor.* Human use of animal resources, with emphasis on prehistoric hunting and fishing practices. Origins of animal domestication.

ANT 5246—Ritual and Symbolic Systems (4) Explores the various approaches to the understanding of symbolism through an examination of the structures, properties, and functions of myth and ritual. Systems of thought as described in the anthropological studies of traditional African, Oceanian, Australian, and American societies provide the data.

ANT 5266—Economic Anthropology (5) Concept of surplus. Classics of economic anthropology. Controversies between substantivists and formalists. Theoretical assumptions of contemporary case studies.

ANT 5336—The Peoples of Brazil (4) Ethnology of Brazil. Historical, geographic, and socioeconomic material will be covered and representative monographs from the various regions of Brazil will be read. The contribution of the Indian, Portuguese, and African to modern Brazilian culture.

ANT 5337—Peoples of the Andes (4) The area-cotradition. The Spanish Conquest. The shaping and persistence of colonial culture. Twentieth-century communities—their social, land tenure, religious, and value systems. Modernization, cultural pluralism, and problems of integration.

ANT 5338—The Tribal Peoples of Lowland South America (4) Survey of marginal and tropical forest hunters and gatherers and horticulturalists of the Amazon Basin, Central Brazil, Paraguay, Argentina, and other areas of South America. Social organization, subsistence activities, ecological adaptations, and other aspects of tribal life will be covered.

ANT 5346—Caribbean Cultural Patterns (4) Investigation into cultural contact that has taken place in the Caribbean and results of that contact in terms of peoples and sociocultural units produced and processes of culture change involved.

ANT 5354—The Anthropology of Modern Africa (4) Study of continuity and change in contemporary African societies, with special reference to cultural and ethnic factors in modern nations.

ANT 5423—Kinship and Descent (4) Systematic and analytical treatment of marriage, descent, and alliances on a cross-cultural basis. Examination of social behavior and terminologies related to kinship systems drawn from traditional and modern societies.

ANT 5464—Culture and Aging (5) *Prereq: two of following: ANT 2410, SOC 2000 or introductory psychology course.* Cross-cultural perspectives of adult development and aging in traditional and industrial society. This course includes comparative assessment of culturally mediated, life-cycle transformations into old age and health related and human service policy issues.

ANT 5466—Folk Medicine (3) Folk cultures viewed in terms of health and well-being. Formal and informal health care methods, concepts of disease and healing viewed in cross-cultural perspective.

ANT 5467—Culture and Nutrition (5) *Recommended prereq:* HUN 3221. The theory, methodology, and substantive material of nutritional anthropology. Emphasis on cross-cultural bio-behavioral patterns.

ANT 5477—Human Organization and Change (5) Theory and practice in applied anthropology. A case study approach to innovation and change in social institutions and cultural practices, with emphasis upon problems of planning and administration.

ANT 5479—Theories of Cultural Change (4) Study of the background, conditions and nature of cultural change and stability; cultural change theories and processes such as diffusion, acculturation, modernization, and revitalization.

ANT 5485—Methodological Foundation for Anthropology (4) Examination of empirical and logical basis of anthropological inquiry; analysis of theory construction, research design, problems of data collection, processing, and evaluation.

ANT 5486—Quantitative Methods for Anthropology (5) *Prereq: ANT 5485 or consent of instructor.* Introductory survey of relevant quantitative procedures for collecting, analyzing, and interpreting anthropological data.

ANT 5507—Bio-Behavioral Perspective on Human Character Structure (5) Application of ethological and psychodynamic concepts to the evolution of human psyche and character.

ANT 5528—Anthropological Genetics (4) An advanced course on human population genetics including demographic models for small extinct and extant populations; human developmental, medical, and behavioral genetics.

ANT 5546—Seminar: Biological Basis of Social Behavior (4) *Prereq: consent of instructor.* Social behavior among animals from the ethological-biological viewpoint; the evolution of animal societies; the relevance of the ethological approach for the study of human development.

ANT 5615—Language and Culture (5) Principles and problems of anthropological linguistics. The cross-cultural and comparative study of language. Primarily concerned with the study of non-Indo-European linguistic problems.

ANT 5622—Phonology: Anthropological Field Methods (5) *Prereq: ANT 5625.* Phonetics and phonemics, phonemic analysis, phonological theory, transcription, primary interest on non-Indo-European systems. Informants are used.

ANT 5624—Introduction to Anthropological Linguistic Field Methods (5) *Prereq: ANT 5625, 5622, or equivalent.* Field procedures, collections, and processing of language data.

ANT 5675—Laboratory Work in Anthropological Linguistics (1-5; max: 15)

ANT 5717—Anthropological Perspectives on Planned Behavioral Worlds (4) The structure, function and culture of planned social units within contemporary societies. Cross-cultural perspectives on specialized social organizations, such as bureaucracies, factories, hospitals, prisons and other planned social systems.

ANT 6038—Seminar in Anthropological History and Theory (4) Theoretical principles and background of anthropology and its subfields.

ANT 6127—Laboratory Training in Archeology (5) *Prereq: ANT 2141 or ANT 3142 or ANT 3144.* Processing of data recovered in field excavation; includes cleaning, identification, cataloguing, classification, drawing, analysis, responsibilities of data reporting.

ANT 6186—Seminar in Archeology (5; max: 15) Selected topic.

ANT 6188—Advanced Archeological Field Methods (9) *Prereq: consent of instructor.* Planning, directing, and reporting archeological excavations. Students encouraged to prepare publishable papers.

ANT 6276—Principles of Political Anthropology (5) Problems of identifying political behavior. Natural leadership in tribal societies. Acephalous societies and republican structures. Kingship and early despotic states. Theories of bureaucracy.

ANT 6286—Seminar in Ethnology (5; max: 15) Areas treated are North America, Central America, South America, Africa, Oceania.

ANT 6356—Peoples and Culture in Southern Africa (5) Prehistoric times through first contacts by explorers to settlers; the contact situation between European, Khoisan, and Bantu-speaking; empirical data dealing with present political, economic, social, and religious conditions.

ANT 6387—Seminar on the Anthropology of Latin America (5; max: 15) *Prereq: reading knowledge of Spanish or Portuguese and consent of instructional staff.* Material from the major branches of anthropology.

ANT 6388—Ethnographic Field Methods (5) Methods for collecting ethnographic data. Entry into the field; role and image conflict. Participant observation, interviewing, content analysis, photography and documents, data retrieval, analysis of data.

ANT 6408—Principles of Cultural Anthropology (5) Nature of culture, social organization, and culture and personality. Theoretical orientations in topical and area studies, with emphasis on cultural dynamics.

ANT 6428—Culture and Community (5) *Prereq: 15 to 20 credits in social sciences.* Examination of the method and theory of the empirical, inductive, natural history approach in the study of communities. Existing community studies are utilized to provide comparative analyses of social structure, culture patterns, and process of change.

ANT 6429—Cultural Pluralism (4) *Prereq: consent of instructor.* Comparative anthropological perspectives on the geographic-ecological context and culture-historical main currents of North American and Latin American ethnic groups. Pluralistic basis of contemporary community systems and socioeconomic and political consequences of multiculturalism examined. Problems of multiethnic stratification within national cultures stressed.

ANT 6434—Psychological Anthropology (5) Recent and contemporary theoretical and methodological developments in the cultural aspects of cognitive and perceptual socio- and psycho-linguistic interactional and transactional processes. Ordinary and abnormal developmental experiences in different cultural contexts related to personal character and social identity formation.

ANT 6445—African Urbanization (5) Current conditions and problems flowing from detribalization, acculturation, and urbanization. Changes in values, attitudes, and institutions, as well as the reaction among the peoples of Africa in the form of traditional survivals, cultural revivals, and innovations.

ANT 6447—Seminar in Structure and Process in the Urban Environment (5) *Prereq: consent of instructor.* Anthropological view of the city through interaction of spatial and temporal behavior, ecology, culture institutions, and urban morphology.

ANT 6478—Comparative Structure and Process of Natural Groups (5) *Prereq: 15 to 20 credits in social sciences.* Comparative analysis of structure and process of natural groups in animal and human societies based on empirical studies of nonhuman primates, hunting bands, simple agriculturists, and natural groups in complex societies.

ANT 6487—Evolution of Culture (5) *Prereq: ANT 3141.* Theories of culture growth and evolution from cultural beginnings to dawn of history. Major inventions of man and their significance.

ANT 6489—Pattern, Structure, and Process (5) *Prereq: 15 to 20 credits in social sciences.* Advanced seminar in the theory of social anthropology.

ANT 6547—Human Adaptation (5) *Prereq: ANT 3511 or permission of instructor.* An examination of adaptive processes —cultural, physiological, genetic—in past and contemporary populations.

ANT 6588—Seminar in Physical Anthropology (5; max: 15) Selected topic.

ANT 6619—Seminar in Language and Culture (5; max: 15) *Prereq: ANT 5625.* Selected topic.

ANT 6627—Seminar in Anthropological Linguistic Field Methods (5; max: 15) *Prereq: ANT 5624.* Analysis of a particular language through an informant.

ANT 6707—Seminar on Applied Anthropology (5) *Prereq: ANT 5477 or instructor's permission.* Consideration of planned socio-cultural and technological change and development in the United States and abroad; special and cultural problems in the transferral of technologies; community de-

velopment and aid programs. Comparative program evaluation.

ANT 6716—Problems of National Integration in Latin America (5) Conceptual problems of the society and culture of selected nation-states: nationalism, urbanization, peasant revitalization movements as integrative or divisive forces. Vertical institutions: church, school, markets, plantation, in particular communities.

ANT 6718—Directed Culture Change in Latin America (5) Utopias in Latin American culture history. The Spanish Conquest as a social experiment. The post-Independence Liberal Reforms and social revolutions, compared with contemporary attempts at community development.

ANT 6725—Culture and Learning (5) *Prereq: ANT 6728, or 15 credits in social sciences.* Cultural learning as a function of social environment based on studies of socialization practices in primate and human societies.

ANT 6728—Anthropology and Education (5) Comparative study of teaching and learning processes in societies of differing complexity and cultural variability. Empirical data examined from an anthropological perspective and in the context of theories about culture and perception, world view, rites of passage, culture and personality, and change.

ANT 6735—Seminar in Cross-Cultural Epidemiology (5) *Prereq: consent of instructor.* Disease patterns; health and well-being examined on a comparative cultural basis.

ANT 6737—Medical Anthropology (5) *Prereq: consent of instructor.* Theory of anthropology as applied to nursing, medicine, hospital organization, and the therapeutic environment. Course includes instrument design and techniques of material collection.

ANT 6905—Individual work (1-5; max: 15) Guided readings on research in anthropology based on library, laboratory or field work.

ANT 6910—Supervised Research (1-5)

ANT 6915—Research Projects in Social, Cultural and Applied Anthropology (1-5; max: 15) *Prereq: consent of instructor.* For students undertaking directed research in supplement to regular course work.

ANT 6917—The Profession of Anthropology (2) *Required of all graduate students.* Organization of the anthropological profession in teaching and research. Relationship between subfields and related disciplines; the anthropological experience; ethics.

ANT 6933—Special topics in Anthropology (5; max: 15) *Prereq: consent of instructor.*

ANT 6940—Supervised Teaching (1-5)

ANT 6945—Internship in Applied Anthropology (1-12; max: 12) *Prereq: permission of graduate coordinator.* Required of all students registered in programs of nonacademic anthropology and/or nonthesis M.A. program. Students are expected to complete 6-12 hours.

ANT 6971—Research for Master's Thesis (1-15)

ANT 7980—Research for Doctoral Dissertation (1-15)

ZOO 6126—Historical Ecology of the Pleistocene (4) Pleistocene environments and ecosystems with emphasis on world-wide chronology and correlation, and intermediate-term historical processes that require 10^2 to 10^4 years for significant expressions.

ARCHITECTURE
College of Architecture

GRADUATE FACULTY 1979-80

Dean: M. T. Jaroszewicz. *Chairman:* A. F. Butt. *Graduate Coordinator:* H.B. Hamacher. *Professors:* E. R. Bartley; A. F. Butt; E. E. Crain; C. Feiss; H. B. Hamacher; M. T. Jaroszewicz; B. Y. Kinzey, Jr.; H. C. Merritt, Jr.; J. W. Milliman; F. B. Reeves; L. G. Shaw; H. H. Smith; E. M. Starnes; B. F. Voichysonk; W. G. Wagner; W. L. Weismantel. *Associate Professors:* J. F. Alexander, Jr.; E. E. Crain; A. J. Dasta; D. W. Donelin; E. M. Fearney; M. T. Foster; H. W. Kemp; F. F. Lisle, Jr.; J. M. McRae; G. Ridgdill; J. A. Sanderson; G. Scheffer; M. M. Solis; O. F. Wetterqvist; I. H. Winarsky. *Assistant Professors: A. J. Davis; C. F. Morgan; J. E. Stoeckel; T. R. White; P. P. Wisley.*

The Department of Architecture offers graduate work leading to the Master of Arts in Architecture. Students are encouraged to enter the program in the fall quarter. They should not plan to take more than three consecutive quarters without a one-quarter interruption. Two years in residence are normally required for completion.

Prerequisite to admission to the Masters of Arts in Architecture program is the degree Bachelor of Design, with appropriate studies in architecture or a degree determined by the department to be equivalent. Graduation from an accredited school of architecture having a five-year course of study is acceptable. In addition to satisfying University requirements for admission, applicants may be required to submit to the Department of Architecture supplementary material as evidence of an active interest in architectural work. The applicant should request detailed instructions from the department regarding such submission.

The student is expected to pursue studies related to a special field of interest—architectural design, architectural history, architectural structures, environmental technology, or architectural preservation. Additional information concerning programs for each of these areas is available from the department.

The student's overall college experience, including undergraduate programs in architecture and the two-year graduate program, is intended to be a complete unit of professional training leading toward practice in architecture or related professions. Concentration in this special field of interest should prepare the student for architectural practice with special emphasis upon professional team membership.

Under special circumstances, the graduate faculty of the department may elect to admit students who have a Bachelor of Architecture degree from a five-year program for a one-year graduate program leading to the Master of Arts in Architecture. In these cases, the minimum registration required is 45 credits, including nine credits in ARC 6971 or ARC 6265.

The department reserves the right to retain student work for the purposes of record, exhibition, or instruction.

ARC 5535—Architectural Structures (5) *Prereq: ARC 4561.*

ARC 5791—Problems in Architectural History (4) *Prereq: ARC 4741.*

ARC 5792—Studies in Architectural Theory (4) *Prereq: ARC 4731.*

ARC 5800—Survey of Architectural Preservation, Restoration, and Reconstruction (4)

ARC 5810—Techniques of Architectural Documentation (4)

ARC 5890—Historic Preservation and Restoration: Interiors (4)

ARC 5891—Historic Preservation and Restoration: Landscape Architecture (4)

ARC 6241—Professional Core I (9) Architectural theory emphasizing cultural and technological factors with application to architectural solutions. Required of all graduate students.

ARC 6242—Professional Core II (9) Architectural theory emphasizing cultural and technological factors with application to architectural solutions. Required of all graduate students.

ARC 6265—Terminal Project (1-15) Course work in lieu of thesis, subject to approval of the supervisory committee. If work is a team project, the individual student must show evidence of his portion of the work accomplished. H.

ARC 6275—Professional Core III (2) *Prereq: sixth-year standing. Required for all ARC graduate students.*

ARC 6347C—Architectural Design III (8) Design of buildings within an urban complex. Forces of physical and social planning which influence the design.

ARC 6355C—Architectural Design IV (8) Design of buildings within an architectural complex of established character.
ARC 6356C—Architectural Design V (8) An in-depth analysis of building design to integrate the structural, mechanical and detail systems. Most students will take this course as a group effort but in special cases with faculty approval individual studies can be conducted coupled with ARC 6265. H.
ARC 6391C—Architecture, Energy and Ecology (4) Integration of energetic and environmental influences on architectural design.
ARC 6393C—Advanced Architectural Connections (4) *Prereq: 6th year standing.* An analysis of architecture connections and details relative to selected space, form, and structural systems.
ARC 6521—Advanced Architectural Structures VII (4) *Prereq: ARC 5535.* Study of various soil properties and their applications in solving architectural design problems.
ARC 6541—Advanced Architectural Structures I (4) *Prereq: ARC 5535.* Principles and application of timber construction to architectural design problems.
ARC 6552—Advanced Architectural Structures II (4) *Prereq: ARC 5535. Coreq: ARC 6555.* Theory and behavior of structural steel systems, and their responses to the solution of architectural problems.
ARC 6555—Advanced Architectural Structures III (6) *Prereq: ARC 5535. Coreq: ARC 6552.* Applications of structural steel systems to selected architectural problems.
ARC 6565—Advanced Architectural Structures IV (4) *Prereq: ARC 5535. Coreq: ARC 6566.* Theory and behavior of reinforced concrete systems and their responses to the solution of architectural problems.
ARC 6566—Advanced Architectural Structures V (6) *Prereq: ARC 5535. Coreq: 6565.* Applications of reinforced concrete systems to selected architectural problems.
ARC 6571—Advanced Architectural Structures VI (4) *Prereq: 5535.* Design and applications of precast and/or prestressed concrete elements in architecture.
ARC 6591—Advanced Architectural Structures VIII (4) *Prereq: ARC 6552, 6565, 6521.* Investigation of selected problems in the field of architectural structures. Emphasis on student special interests.
ARC 6592—Advanced Architectural Structures IX (4) Directed studies and problems in collaboration with a team of students involving a coordinated building design. Architectural, structural, and environmental aspects of a problem.
ARC 6632—Environmental Systems Design Laboratory IV (4) *Coreq: ARC 6633.* Problems in the thermal and atmospheric control of buildings.
ARC 6633—Environmental Systems Design IV (4) *Coreq: ARC 6632.* Studies in thermal and atmospheric control of buildings.
ARC 6642—Environmental Systems Design Laboratory III (4) *Coreq: ARC 6643.* Problems in architectural acoustics.
ARC 6643—Environmental Systems Design III (4) *Coreq: ARC 6642.* Studies in architectural acoustics.
ARC 6651—Environmental Systems Design Laboratory VI (4) *Coreq: ARC 6652.* Total energy systems, solar energy, heat conservation and similar contemporary problems and trends.
ARC 6652—Environmental Systems Design VI (4) *Coreq: ARC 6651.* Lecture portion of ARC 6651.
ARC 6684—Environmental Systems Design I (4) Studies in lighting, electric power, and sanitation systems for buildings. Part I.
ARC 6685—Environmental Systems Design II (4) *Prereq: ARC 6684.* Studies in lighting, electric power, and sanitation systems for buildings. Part II.
ARC 6691—Environmental Systems Design V (4) Special studies in environmental systems related to current developments.
ARC 6713—Architectural History I (4) *Prereq: 9 credits of architectural history.* History of western civilization, with emphasis on architectural developments in their historical, physical, ideological, artistic, and social context.
ARC 6735—Architectural History II (4) *Prereq: ARC 6713.*
ARC 6742—Architectural History III (4) *Prereq: ARC 6735.*
ARC 6750—Architectural History: American I (4) *Prereq: 9 credits of architectural history.* Development of American architecture and the determinants affecting its function, form and expression.
ARC 6751—Architectural History: American II (4) *Prereq: ARC 6750.*
ARC 6761—Architectural History: Area Concentration (5; max: 15) *Prereq: ARC 6742.* Development of techniques for search in architectural history.
ARC 6771—Architectural History: Literature and Criticism (5; max: 15) *Prereq: ARC 6713.* Individual research with concentration on writing and architectural criticism.
ARC 6793—Architectural History: Regional (4) *Prereq: ARC 6751.* Group and individual studies of architecture unique to specific geographic regions.
ARC 6851—Technology of Preservation: Materials and Methods I (4) *Prereq: ARC 5800.* Materials, elements, tools and personnel of traditional building.
ARC 6852—Technology of Preservation: Materials and Methods II (4) *Prereq: ARC 6851.*
ARC 6853—Technology of Preservation: Problems and Processes (4)
ARC 6854C—Technology of Preservation: Programming and Design I (4) *Prereq: ARC 6851.*
ARC 6855C—Technology of Preservation: Programming and Design II (4) *Prereq: ARC 6851.*
ARC 6860—Techniques of Preservation: Legal and Economic Processes (4)
ARC 6910—Supervised Research (1-5)
ARC 6911—Architectural Research I (1-9) Special studies adjusted to individual needs. H.
ARC 6912—Architectural Research II (1-9) Special studies adjusted to individual needs. H.
ARC 6913—Architectural Research III (1-9) Special studies adjusted to individual needs. H.
ARC 6940—Supervised Teaching (1-5)
ARC 6971—Research for Master's Thesis (1-15)

ART
College of Fine Arts

GRADUATE FACULTY 1979-80

Chairman and Graduate Coordinator: R. H. Westin. *Graduate Research Professor:* J. N. Uelsmann. *Professors:* R. C. Craven, Jr.; E. E. Grissom; K. A. Kerslake; J. G. Naylor; J. J. Sabatella; P. A. Ward; H. D. Williams. *Associate Professors:* J. A. O'Connor; E. Y. Streetman; R. H. Westin.

Master of Fine Arts Degree: An undergraduate major in art with adequate preparation in studio course in fine art and/or in the history, theory and criticism of art is prerequisite to admission. Graduate study is divided between studio courses in ceramics, creative photography, drawing, painting, printmaking, sculpture, multi-media and the history of art. Applicants for admission to a studio major must submit a portfolio. Two years of residence are normally required for completion of the requirements for this degree.

ARH 6897 and 6898 are required for all graduate majors. ARH 5805 is required of all students who select the written thesis option. ARH 6899 is required of those who select the nonthesis creative research option. All other graduate courses may be repeated for credit with change of content. Some of the courses listed are offered regularly, while others are offered only as needed.

The department reserves the right to retain student work for the purposes of record, exhibition, or instruction.

ARH 5805—Methods of Research and Bibliography (4)
ARH 5905—Individual Study (4 or 6) May be repeated with change of content.
ARH 6791—Research in Methods and Materials of the Artist (4 or 6) May be repeated with change of content.

ARH 6897—Seminar: Problems in the History, Theory, and Criticism of Art I (4)
ARH 6898—Seminar: Problems in the History, Theory, and Criticism of Art II (4)
ARH 6899—Seminar: Problems in the History, Theory, and Criticism of Art III (4)
ARH 6910—Supervised Research (1-5)
ARH 6911—Advanced Study (4 or 6) *Prereq: major in fine arts.* Art history. May be repeated with change of content.
ARH 6971—Research for Master's Thesis (1-15)
ART 5905C—Individual Study (4 or 6) May be repeated with change of content.
ART 6340C—Advanced Drawing (4) *Prereq: ART 4312.* May be repeated with change of content.
ART 6835—Research in Methods and Materials of the Artist (4 or 6) May be repeated with change of content.
ART 6910C—Supervised Research (1-5)
ART 6927C—Advanced Study (4 or 6) *Prereq: major in fine arts.* Ceramics, drawing, painting, printmaking, creative photography or sculpture. May be repeated with change of content.
ART 6940—Supervised Teaching (1-5)
ART 6971—Research for Master's Thesis (1-15)
ART 6973C—Individual Project (1-15) Creative project in lieu of written thesis. S/U.

ASTRONOMY
College of Liberal Arts and Sciences

GRADUATE FACULTY 1979-80

Chairman: H. K. Eichhorn. *Graduate Coordinator:* G. R. Lebo. *Graduate Research Professor:* A. E. S. Green. *Professors:* T. D. Carr; K-Y Chen; H. K. Eichhorn; J. H. Hunter, Jr.; G. C. Omer, Jr.; A. G. Smith; R. E. Wilson; F. B. Wood. *Associate Professors:* J. R. Buchler; H. L. Cohen; F. F. Donivan, Jr.; S. T. Gottesman; G. R. Lebo; M. A. Lynch; J. P. Oliver; C. N. Olsson; C. A. Williams.* *Assistant Professor:* H. C. Smith, Jr.

*This member of the faculty of the University of South Florida is also a member of the graduate faculty of the University of Florida and participates in the doctoral degree program in the University of Florida Department of Astronomy.

The Department of Astronomy offers graduate work in astrophysics leading to the degrees Master of Science and Doctor of Philosophy. Current research fields include radio astronomy, astrometry, cosmology, photometry of close binaries and intrinsic variables, photometry of quasars and galaxies, and certain topics of astrophysical theory.

For unqualified admission to the program, a student should have an acceptable undergraduate degree in physics or astronomy. Students with degrees in related fields, such as engineering or mathematics, may be admitted with the understanding that certain foundation courses will have to be taken. If desirable, an individual with a strong background in physics may perform the graduate research work in astronomy but take the qualifying examination and degree in physics, rather than astronomy. All degree candidates are required as part of their training to assist in the department's teaching program. Complete details of the program and research facilities are included in an illustrated booklet obtained by writing the Chairman, Room 231, Space Sciences Research Building.

ASI 6105—Astronomical Techniques I (3) *Prereq: AST 3016C.* Theory and practice in the design and use of astronomical instruments; observation and reduction procedures used in applications such as astronomical photography, spectroscopy, and photoelectric photometry.
ASI 6106—Astronomical Techniques II (3) *Prereq: ASI 6105.*
ASI 6115—Astronomical Techniques III (3) *Prereq: PHY 4324 or equivalent.* Theory and practice in design, construction, and use of radio astronomical instruments. Emphasis on design and construction of special radio astronomy receiving and antenna systems. Measurement techniques necessary for construction and use of systems are presented.
ASI 6116—Astronomical Techniques IV (3) *Prereq: ASI 6115.*
ASI 6205—Radio Astronomy I (3) *Prereq: AST 3016C; Coreq: PHY 5325, 5722C.* Measurement parameters; instrumentation of radio and radar astronomy emission mechanism theories; radio propagation in plasma; observational results of radio and radar astronomy and their interpretation.
ASI 6206—Radio Astronomy II (3) *Prereq: ASI 6205.*
ASI 6207—Radio Astronomy III (3) *Prereq: ASI 6206.*
AST 5043—History of Astronomy (3) *Prereq: AST 1002 or 2003C-2004C or 3016C.* A general survey of the history of astronomy from the earliest times down to the present day.
AST 5113—Solar System Astrophysics I (3) *Prereq: two years of college physics.* Survey of the solar system, including its origin and laws of planetary motion. The earth as a planet: geophysics, aeronomy, geomagnetism, and the radiation belts. Solar physics and the influence of the sun on the earth.
AST 5114—Solar System Astrophysics II (3) *Prereq: AST 5113.* The moon and planets; exploration by ground-based and spacecraft techniques. The lesser bodies of the solar system, including satellites, asteroids, meteroids, comets; the interplanetary medium.
AST 5213—Interacting Binary Stars (3) *Prereq: AST 3016C.* A description of the various aspects of interacting binary stars designed chiefly for students who plan to complete their dissertations in other branches of astronomy. Also suitable for undergraduate majors in the Department.
AST 5600—Numerical Astronomy (3) *Prereq: AST 3016C.* Theory and practice in use of numerical methods pertinent to astronomy, especially positional astronomy. Astronomical examples will be used to illustrate accuracy of calculations, interpolation, measurements of precision, and the method of least squares.
AST 6165—Radiopropagation and Ionospheric Physics I (3) *Prereq: PHY 4324.* Propagation of electromagnetic waves in magnetoionic media, with emphasis on the terrestrial ionosphere, and cosmic conditions such as solar corona and interstellar media.
AST 6166—Radiopropagation and Ionospheric Physics II (3) *Prereq: AST 6165.* Ionospheric electron density and ion composition profiles; diurnal, seasonal, and global variations; pre-sunrise effects; electron and ion temperatures; solar flare and magnetic storm effects.
AST 6167—Atomic Physics of Planetary Atmospheres (3) *Prereq: Basic physics course and mathematics courses through integral calculus.* Atomic and quantum theory, quantum mechanics and the central field problem atomic and molecular spectroscopy, collisional cross sections for aeronomy.
AST 6168—Physics of the Earth's Upper Atmosphere (3) *Prereq: AST 6167.* Solar-terrestrial relations, aurora, airglow, and ionospheric phenomena. Remote sensing of atmospheric emissions and scattered solar radiation.
AST 6169—Physics of Planetary Atmospheres (3) *Prereq: AST 6168.* Radiative transfer in planetary atmospheres, from x-ray to radio regions. Discussion of recent studies of the atmospheres of Venus, Mars, Jupiter, and other planets.
AST 6214—Stellar Astrophysics I (3) *Prereq: AST 3016C.* Theoretical and observational approach to evolution, structures, and equilibria of stars.
AST 6215—Stellar Astrophysics II (3) *Prereq: AST 6214.*
AST 6216—Stellar Astrophysics III (3) *Prereq: AST 6215.*
AST 6265—Variable Stars (3) *Prereq: AST 3016C.* Classification, light and spectral changes, population distribution, physical processes causing variability, the place of variables in stellar evolution. Use of variable stars in galactic and extragalactic studies.
AST 6275—Visual and Spectroscopic Binary Stars I (3) *Prereq: AST 3016C, ASI 6106.* Theoretical studies and analyses of observations of both visual and spectroscopic binaries.
AST 6276—Visual and Spectroscopic Binary Stars II (3) *Prereq: AST 6275.*
AST 6277—Eclipsing Binary Stars I (3) *Prereq: AST 3016C, ASI 6106.* Theoretical Studies and analyses of observations of eclipsing variables.
AST 6278—Eclipsing Binary Stars II (3) *Prereq: AST 6277.*

AST 6306—Galactic Structure (3) *Prereq: AST 3016C.* Kinematic and dynamics of the galaxy.
AST 6406—Extragalactic Astronomy and Cosmology (3) *Prereq: AST 3016C.* Interpretations of observational results and current theories concerning galaxies, clusters of galaxies, quasars, and cosmological evolution.
AST 6506—Celestial Mechanics I (3) *Prereq: AST 3016C, PHY 5225.* Analytical and numerical computation of orbits.
AST 6507—Celestial Mechanics II (3) *Prereq: AST 6506.*
AST 6606—Positional Astronomy I (3) *Prereq: AST 5600.* Numerical methods (interpolation, errors, least squares) used in astronomy, especially positional astronomy, coordinate systems and their conversion, reduction of observations (especially reduction to apparent place), time systems, and the determination of proper motion and parallax.
AST 6607—Positional Astronomy II (3) *Prereq: AST 6606.*
AST 6905—Individual work (1-5; max: 10) Supervised study or research in areas not covered by other courses.
AST 6910—Supervised Research (1-5)
AST 6935—Seminar in Modern Astronomy (1; max: 9) Recent developments in theoretical and observational astronomy and astrophysics. S/U.
AST 6940—Supervised Teaching (1-5)
AST 6971—Research for Master's Thesis (1-15)
AST 7157—The Giant Planets (3) *Prereq: AST 5114 or ASI 6207.* Jupiter, Saturn, Neptune, and Uranus; their origins and evolution, interiors, gravitational and magnetic fields, atmospheres, ionospheres, magnetospheres, electromagnetic emissions, and satellites. Emphasis is on Jupiter.
AST 7279—Close Binary Stars (3) *Prereq: AST 6278.* Role of close binaries in stellar evolution. Nonperiodic phenomena, mass loss and exchange, novae and nova-like variables, period changes.
AST 7939—Special Topics (3; max: 18) Assigned reading, programs, seminar, or lecture series in a new field of advanced astronomy.
AST 7980—Research for Doctoral Dissertation (1-15)
PHS 6606—Special Relativity (3) Introduction to Einstein's special theory of relativity employing tensor analysis, general invariance, and the background of the general theory of relativity.
PHS 6616—General Relativity (3) Einstein's general theory of relativity and relativistic cosmology.

BIOCHEMISTRY AND MOLECULAR BIOLOGY
College of Medicine

GRADUATE FACULTY 1979-80

Chairman: M. Young. *Graduate Coordinator:* B. M. Dunn. *Professors:* R. P. Boyce; C. M. Feldherr; W. R. Fisher; M. Fried; R. J. Mans; R. M. Roberts. *Associate Professors:* C. M. Allen, Jr.; P. W. Chun; R. J. Cohen; K. D. Noonan; T. W. O'Brien; D. M. Silverman; G. S. Stein; A. Stevens. *Assistant Professors:* B. M. Dunn; P. J. Laipis; P. M. McGuire; J. F. Remsen; J. Stein.

The Department of Biochemistry and Molecular Biology offers the Master of Science and Doctor of Philosophy degrees with specialization in physical biochemistry, molecular biology, and medical biochemistry.

Specific areas of study include structure and function of cellular and nuclear membranes in mammalian cells; regulation of cell division and gene expression; biochemistry of differentiation; biochemical genetics, inborn errors of metabolism; molecular biology of DNA; replication and repair in bacterial and eukaryotic cells; biosynthesis of RNA, protein, polysaccharides, lipoproteins; isoprenoid metabolism; physical biochemistry of nucleic acids and proteins; mechanism of enzyme action; and marine biochemistry.

New graduate students should have adequate training in general, organic, quantitative, and physical chemistry as well as in physics and biology. Calculus is recommended. (See descriptions listed under *Program in Medical Biochemistry* at the end of this section for requirements of students wishing to specialize in this area.) Minor deficiencies may be made up immediately after entering Graduate School.

Doctoral candidates are required to take a core of biochemistry courses which include BCH 6065, 6156, 6206, 6415, 6876, 6936, and 6937. Depending upon interests and background of the student, additional courses are recommended from the following list: BCH 5055L, 6296, 6746, 7077, 7257, and 7727. The course of graduate study for doctoral candidates also includes advanced organic and physical chemistry, physiology, microbiology, and genetics.

BCH 5055L—Biochemistry Laboratory (2)
BCH 5056—Chemistry of Biological Molecules (4) Mechanistic organic biochemistry. Emphasis on model systems, enzyme active sites, and physical and organic chemistry of biomacromolecules.
BCH 5878—Current Trends in Biochemistry I (2)
BCH 5879—Current Trends in Biochemistry II (2)
BCH 6065—Biochemical Structure and Function (4) *Prereq: organic and physical chemistry.*
BCH 6156C—Research Methods in Biochemistry (2-6; max: 12) *Prereq: BCH 6065, 6206, 6415.* Only by special arrangement. Biochemical research in which the student refines his research techniques in physical biochemistry, intermediary metabolism, and radioisotopes under supervision of a staff member.
BCH 6206—Metabolism (4)
BCH 6296—Bioenergetics and Enzyme Mechanisms (4) *Prereq: BCH 6065, 6206, 6415.* Mechanisms of enzyme action and the energy transformations occurring in biological systems.
BCH 6415—Principles of Molecular Biology and Genetics (4)
BCH 6746—Physical Biochemistry (4) *Prereq: general course in biochemistry, BCH 6065 and in physical chemistry.* Physical chemistry and molecular structures of proteins, enzymes, and nucleic acids. Fundamentals of physical biochemistry techniques.
BCH 6876—Recent Advances in Biochemistry (2) *Prereq: BCH 6065 or equivalent.* Areas of biochemistry and molecular biology selected by the faculty discussed critically and in depth. Emphasis on current controversy and theory, data interpretations, and scientific writing. Classes held informally in small groups during each quarter, involving all biochemistry faculty on a rotating basis. S/U.
BCH 6910—Supervised Research (1-5)
BCH 6936—Biochemistry Seminar (1) Required of graduate students in biochemistry; open to others by special arrangement. Research reports and discussions of current research literature given by the departmental staff, invited speakers, and graduate students. S/U.
BCH 6937—Special Topics in Biochemistry (2; max: 12) *Prereq or coreq: BCH 6065, 6206 or 6415.* Supervised study in publications in specific areas of biochemistry, with informal weekly conferences, reports and lectures; individual faculty in charge of the course on a rotating basis.
BCH 6940—Supervised Teaching (1-5)
BCH 6971—Research for Master's Thesis (1-5)
BCH 7077—Molecular Biology III (4) *Prereq: general course in biochemistry.* Molecular virology; growth and replication of animal viruses; organization and structure of viral and cellular chromosomes; RNA synthesis; translation and transcription; mechanism of regulation of cellular metabolism.
BCH 7257—Molecular Biology II (4) *Prereq: general course in biochemistry.* Biochemistry of nuclei, ribosomes, mitochondria, chloroplasts, Golgi bodies, lysosomes, cell walls and membranes; compartmentation and integrated cellular funtion.
BCH 7627—Biochemistry of Disease (3) *Prereq: general courses in biochemistry.* The molecular basis of human patho-biology. Biochemical mechanisms underlying selected disease states.

BCH 7727—Molecular Biology I (4) *Prereq: general course in biochemistry.* Chemical and physicochemical characteristics of the molecules concerned with heredity, gene replication and mutation, and of their biosynthesis and function.
BCH 7980—Research for Doctoral Dissertation (1-15)

PROGRAM IN MEDICAL BIOCHEMISTRY

GRADUATE FACULTY 1979-80

Director: R. M. Roberts. *Professors:* R. P. Boyce; W. R. Fisher; M. Fried; P. J. Laipis; P. M. McGuire; K. D. Noonan; G. S. Stein; A. Stevens.

A program in medical biochemistry is offered through the Department of Biochemistry and Molecular Biology leading to the M.S. and Ph.D. degrees in biochemistry.

The Ph.D. degree may also be earned as part of the special M.D.-Ph.D. program. This program is open only to medical students enrolled in the College of Medicine at the University of Florida. It is designed to make graduate-level education in biochemistry leading to the M.S. or Ph.D. degree available to specially selected students who are in the process of completing or who have already completed the M.D. degree.

Minimum requirements are a bachelor's degree and, in the case of students enrolled in the M.D.-Ph.D. program, those courses leading toward the M.D. degree. A supervisory committee will be appointed during the first year and will determine, in conjunction with the student, an appropriate curriculum. Besides the core of biochemistry required of all Ph.D. candidates in biochemistry, candidates specializing in medical biochemistry are required to take GMS 5905, GMS 5938, BMS 6260C, BMS 7200C, BMS 7210C, BMS 7220C, BMS 6230C, BMS 6231, BMS 7262C, and either BCH 6971 or 7980.

BOTANY

Colleges of Liberal Arts and Sciences and Agriculture

GRADUATE FACULTY 1979-80

Chairman: W. L. Stern. *Graduate Coordinator:* G. E. Bowes. *Graduate Research Professor:* I. K. Vasil. *Professors:* H. C. Aldrich; J.S. Davis; E. S. Deevey; D. G. Griffin, III; T. E. Humphreys; J. W. Kimbrough; J. T. Mullins; H. L. Popenoe; L. Shanor; R. C. Smith; W. L. Stern; D. B. Ward. *Associate Professors:* G. E. Bowes; J. J. Ewel; T. W. Lucansky; A. E. Lugo. *Assistant Professors:* T. L. Crisman; W. S. Judd.

The Department of Botany offers graduate work leading to the degrees of Master of Science, Master of Agriculture, Master of Science in Teaching, and Doctor of Philosophy.

Specific areas of specialization in botany include anatomy/morphology with emphasis on tropical ferns and aquatic plants; bryology; development of seed plants, protoplast, cell and tissue culture; ecology; mycology with emphasis on morphology, systematics and development; phycology with emphasis on algae of brine ponds; physiology/biochemistry with emphasis on ion uptake, photosynthesis and photorespiration, sugar metabolism and transport, hormonal control of fungal reproduction; systematics with emphasis on monographic and floristic studies.

For admission to graduate standing a student should present credits equivalent to those required for undergraduate majors in the department. Undergraduate major requirements include 36 credits in botany, a course in genetics with laboratory, mathematics through differential calculus, one year of college physics, and chemistry through organic. Those admitted without full equivalents of an undergraduate major will be required to make up the deficiencies by passing appropriate courses early in their graduate programs. A reading knowledge of a foreign language and credit for basic courses in zoology and bacteriology are desirable. The program of graduate study for each student will be determined by a supervisory committee. No more than 10 credits of BOT 6905 may be used to satisfy the credit requirements for a master's degree. Each student pursuing the Ph.D. degree will be required to pass a written departmental examination on designated major areas of botany prior to the qualifying examination.

There are, in addition to the facilities of the department for graduate work, the following special resources that may be utilized in support of graduate student training and research: (1) the Florida Agricultural Experiment Stations, (2) the Marine Sciences Center on the Gulf of Mexico for studies in estuarine and marine habitats, (3) the resources of the Welaka Conservation Reserve, and (4) the Center for Tropical Agriculture, which can support studies in tropical and subtropical areas.

APB 5415—Radioisotope Theory and Techniques (5) *Prereq: CHM 3120C or consent of instructor.* Theory of radioactivity, of interaction with matter, radioactive decay, etc., given in sufficient detail to make the laboratory techniques and practices thoroughly understood.
BOT 5225C—Plant Anatomy (5) *Prereq: BOT 2011C or 3303C or consent of instructor.* Origin, structure, and function of principal tissues and organs of seed plants.
BOT 5405C—Phycology (5) *Prereq: BOT 2011C or 3303C or consent of instructor.* Algae, especially their structure, reproduction, growth, classification, and evolution.
BOT 5435C—Introductory Mycology (5) *Prereq: BOT 2011C or 3303C.* Fungi, with emphasis on comparative morphology.
BOT 5485C—Mosses and Liverworts (5) *Prereq: BOT 2011C or 3303C.* Morphology of the major groups of bryophytes, with emphasis on collection, identification, and ecology of these plants in Florida.
BOT 5505C—Intermediate Plant Physiology (5) *Prereq: BOT 3503, 3503L, and CHM 3200, 3200L, or 3210, 3211, 3210L, 3211L.* Fundamental physical and chemical processes underlying the water relations, nutrition, metabolism, growth, and reproduction of higher plants.
BOT 5625—Plant Geography (3) *Prereq: BOT 5725C.* Geography of the floras and types of vegetation throughout the world, with emphasis on problems of the distribution of taxa, and the main factors influencing types of vegetation.
BOT 5695—Ecosystems of Florida (5) *Prereq: PCB 3043C or equivalent and consent of instructor.* Major ecosystems of Florida in relation to environmental factors and man's relationship to them. Emphasis of all day Saturday field trips is on field problems, techniques and research.
BOT 5725C—Taxonomy of Seed Plants (5) *Prereq: BOT 2011C or 3303C or equivalent.* Seed plants, their classification, gross morphology, and evolutionary relationships.
BOT 5755C—Lower Vascular Plants (5) *Prereq: BOT 5225C and 3153C or 5725C or consent of instructor.* Living and fossil representatives of ferns and other vascular cryptogams, with emphasis on their structure, evolution, and classification.
BOT 6256C—Plant Cytology (5) *Prereq: MCB 4403 or equivalent.* Fundamental structures of plant cells, their functions, reproduction and relation to inheritance; recent research and techniques.
BOT 6316C—Developmental Morphology of Flowering Plants (5) *Prereq: BOT 3303C.* Developmental morphology of the vegetative and reproductive organs of flowering

plants, with particular emphasis on form and function as revealed by recent experimental techniques.

BOT 6326C—Methods and Applications of Plant Cell and Tissue Culture (5) *Prereq: BOT 6316C.* Laboratory techniques for the culture of plant protoplasts, cells, tissues, and organs, and their applications in the study of cellular differentiation, development, genetics, and agriculture.

BOT 6346C—Biology and Taxonomy of Myxomycetes and Phycomycetes (5) *Prereq: BOT 5435C.* Morphology, development, and taxonomy of slime molds, water molds, and allied taxa emphasized.

BOT 6446C—Biology and Taxonomy of the Basidiomycetes (5) *Prereq: BOT 5435C.* Isolating, collecting, and identification of field material required.

BOT 6466C—Biology and Taxonomy of Ascomycetes and Their Imperfect Stages (5) *Prereq: BOT 5435C.* Morphology, development, and taxonomy of the Ascomycetes and Fungi Imperfecti emphasized. Field work required.

BOT 6476C—Lichenology (5) *Prereq: BOT 2011C or equivalent.* The morphology and taxonomy of the lichens, with emphasis on their identification. Field trips to nearby areas of interest.

BOT 6496C—Fungal Physiology (5) Comparative physiology of growth, development, metabolism, and reproduction of selected fungi.

BOT 6516—Plant Metabolism (3) *Prereq: BOT 5505C, BCH 4203.* Metabolism of carbohydrates, fats, and nitrogen compounds in higher plants; cell structure as related to metabolism; metabolic control mechanisms.

BOT 6526—Plant Nutrition (3) *Prereq: BOT 5505C.* Plant nutrition, including essentiality of elements, absorption of ions, utilization of minerals in plants, and water metabolism.

BOT 6566—Plant Growth and Development (3) *Prereq: BOT 5505C.* Ways in which environmental factors influence plant growth and development.

BOT 6576—Photophysiology of Plant Growth (4) *Prereq: BOT 5505C.* Effects of light on the physiology and biochemistry of plants. Photosynthesis and photorespiration emphasized. Properties of light sources, photochemistry, phytochrome action, photomorphogenesis, photoperiodism, and phototropism examined.

BOT 6646C—Ecology of Aquatic Plants (5) *Prereq: PCB 3043C.* Aquatic plants, their morphology, physiology, anatomy and role in aquatic ecosystems. Field trips emphasize the flow of energy and systems structure.

BOT 6666—Advanced Tropical Botany (12) *Prereq: BOT 3503; PCB 5046C or BOT 5725C.* Limit: 10 participants. Offered Summer Quarter in Costa Rica as part of the program of the Organization for Tropical Studies. Topics are changed each year.

BOT 6716C—Advanced Taxonomy (3) *Prereq: BOT 5725C.* Problems in the classification of vascular plants. Published taxonomic studies reviewed as demonstration of techniques and principles involved in classification; intensive individual work required in field and herbarium application of procedures.

BOT 6905—Individual Studies in Botany (1-5; max: 10) *Prereq: approval of department chairman and consent of instructor.* Individual, nonthesis, research problem in one or more of the following areas of botany: ecology, physiology and biochemistry, cryptogamic botany, morphology and anatomy of vascular plants, systematics, cytology and ultrastructure. Work selected to meet the interests and needs of the student.

BOT 6910—Supervised Research (1-5)

BOT 6927—Advances in Botany (1-5; max: 5) Supervised study in specific areas of botany.

BOT 6936—Graduate Student Seminar (1; max: 3) Readings and oral presentation on general topics in botany. S/U.

BOT 6940—Supervised Teaching (1-5)

BOT 6951—Tropical Biology: An Ecological Approach (12) Intensive field study of ecological concepts in tropical environments. Eight weeks in different principal kinds of tropical environments. Offered Summer Quarter in Costa Rica as part of the program of the Organization for Tropical Studies.

BOT 6971—Research for Master's Thesis (1-15)

BOT 7980—Research for Doctoral Dissertation (1-15)

PCB 5046C—Advanced Ecology (4) *Prereq: PCB 3043C or equivalent; physics, chemistry, statistics, physiology and calculus are desirable.* Diversity measures, population dynamics, ecosystem classification, quantitative plant sociology, nutrient cycles, energy flow, productivity, modeling and computer simulation, and budgets at the ecosystem level.

PCB 5115C—Cytology (5) *Prereq: one year of general biology or equivalent, and consent of instructor.* Microscopic components of plant and animal cells. Structure, chemical constitution and function of the cell wall, protoplasm, cytoplasmic constituents and nucleus.

PCB 6176—Electron Microscopy of Biological Materials (2) *Prereq: MCB 4403, or equivalent and consent of instructor.* Use of the electron microscope, including fixation, embedding, sectioning, freeze-etching, negative staining, and use of the vacuum evaporator.

PCB 6176L—Laboratory in Electron Microscopy (2) *Prereq: MCB 4403 or equivalent, PCB 6176 or concurrent registration in PCB 6176, and consent of instructor.* Laboratory training in use of electron microscopes, ultramicrotomes, vacuum evaporators, and freeze-etch machines.

PCB 6216—Cytochemistry (4) *Prereq: MCB 4403 or equivalent.* Cellular organization, cell function, and cytochemical technique.

PCB 6356C—Ecosystems of the Tropics (4) *Prereq: PCB 3043C.* Natural and man-dominated tropical ecosystems, their structure, function, and relation to man.

PCB 6626C—Fungal Genetics (5) Comparative genetics of mating type and sexual development, chromosome mapping, polyploidy, gene structure and function, and pathogenicity of selected fungi.

PCB 6691—Topics in Genetics (2-4; max: 12)

ZOO 6126—Historical Ecology of the Pleistocene (4) Pleistocene environments and ecosystems with emphasis on worldwide chronology and correlation and intermediate-term historical processes that require 10^2 to 10^4 years for significant expression.

SCHOOL OF BUILDING CONSTRUCTION
College of Architecture

GRADUATE FACULTY 1979-80

Director: D. A. Halperin. *Graduate Coordinator:* B. H. Brown, Jr. *Professors:* B. G. Eppes; D. A. Halperin. *Associate Professors:* R. A. Aderholdt; B. H. Brown, Jr.; H. F. Holland.

Courses are offered leading to the degrees of Master of Science in Building Construction (thesis) and Master of Building Construction (nonthesis). An individual plan of study is prepared for each student to insure that the student's goals are achieved within the broad policy guidelines of the School. Specialization may be in areas related to construction such as the construction manager concept, planning and scheduling, cost control, high rise construction, materials, techniques and structural concepts.

There is no foreign language requirement. The objectives of this graduate program are to (1) provide advanced construction courses, (2) provide opportunity for study of construction problems and subjects in depth, (3) broaden the student's base of knowledge and understanding in the construction areas, (4) prepare for teaching, and (5) prepare for research.

Holders of the four-year undergraduate degree in building construction or its equivalent in related fields may normally complete the requirement for the master's degree in one academic year (three quarters) as full-time students. "Equivalent in related fields" should include studies in construction materials and methods, structures, and management. Students with undergraduate degrees but with deficiencies in these related fields may need longer residence for the master's degree, as they will be required to take speci-

fied basic courses to provide foundation for advanced courses.

The department reserves the right to retain student work for purposes of record, exhibition, or instruction. .

BCN 5226—Advanced Construction Techniques (4) *Prereq: BCN 3325.* Advanced continuation of BCN 3325.
BCN 5463—Advanced Construction Structures (4) *Prereq: BCN 3325, 3461.* Advanced topics in design of construction structures.
BCN 5470—Systems of Architectural Construction (4) *Prereq: BCN 3224.* Study of industrialized construction techniques, designs, and costs for American and foreign systems.
BCN 5528—Survey of Construction Techniques (5) Survey of work methods, materials, and equipment employed on residential, commercial, and industrial construction projects.
BCN 5625—Construction Cost Analysis (4) *Prereq: ACC 2001, BCN 4612.* Comparative analysis of actual and estimated costs as used for project control.
BCN 5715—Advanced Construction Labor Problems (4) *Prereq: graduate status.* An analysis of labor problems facing the construction industry in today's market derived from significant historical events, the changes in legislation, and economic conditions which brought these about.
BCN 5722—Advanced Construction Planning and Control (4) *Prereq: COP 3110, BCN 4612.* Time-cost relationships for various construction operations.
BCN 5905—Special Studies in Construction (1-5; max: 15) Special studies provide requirements of students desiring supplemental work in the building construction area.
BCN 6910—Supervised Research (1-5)
BCN 6931—Construction Management (1-10; max: 15) Studies in construction management or in specialized areas of the construction field.
BCN 6932—Building Construction Management (1-10; max: 15) Studies in building technology and management or in specialized area of the building construction field.
BCN 6933—Building Research (1-10; max: 15) Studies and investigations of selected problems in the construction field. H.
BCN 6934—Construction Research (1-10; max: 10) Independent studies and research of selected problems in construction field. H.
BCN 6940—Supervised Teaching (1-5)
BCN 6971—Research for Master's Thesis (1-15)

BUSINESS ADMINISTRATION—GENERAL

College of Business Administration

Graduate programs offered by the College of Business Administration are the Doctor of Philosophy with a major in economics or with a major in business administration, Master of Arts in economics; finance, insurance, and real estate; management; marketing; and the Master of Business Administration. Fields of concentration and requirements for the MBA are given under *Requirements for Master's Degrees* in the front section of the *Catalog*. Requirements for the Ph.D. in economics and for all M.A. degrees may be found under the description for the respective department.

The Ph.D. in business administration requires a principal or major field in one of the following: accounting, finance, insurance, management, marketing, or real estate and urban analysis. Requirements of the specific departments and specialties within the departments are stated in the departmental descriptions in this *Catalog*. All candidates for the Ph.D. in business administration must satisfy the following core requirements.

GEB 5805—Mathematical Methods and Their Application to Business and Economics Analysis (5)
STA 6166—Statistical Methods in Reseach I (4)
STA 6167—Statistical Methods in Research II (4)
MAN 6108—Concepts and Methods in the Behavioral Sciences (5)
ECO 6206—Macro Economic Theory (5)
ECO 6116—Price Theory (5)

Procedures for waiving these core requirements have been established. Additionally, the candidate must meet requirements for one or two minors. More detailed information may be obtained from the Associate Dean, College of Business Administration, Matherly Hall.

Admission Requirements: Applicants for all graduate programs in the Collge of Business Administration must meet the Graduate School's admission standards. These applicants may, however, use the Graduate Management Admission Test (GMAT) rather than the Graduate Record Examination Aptitude Test. Candidates for admission to the MBA program are required to take the GMAT.

CAP 5009—Computer Concepts in Business (3) *Designed for MBA candidates who lack adequate preparation for utilizing computer hardware and software systems in managerial problem solving.* Mechanics and functioning of computer systems emphasizing applications of software packages in managerial decision making and problem solving.
CAP 5021—Computer-Based Business Management (4) *Prereq: COP 3110, or consent of instructor.* Principles of data-processing management and the application of computers in solving business problems.
FIN 6937—Advanced Finance Topics (4) *Designed for MBA candidates. Prereq: all MBA foundation sequence courses.* Analysis of organizational problems from a financial perspective integrating concepts from various organizational functions such as production, marketing, and personnel.
GEB 5756—Introduction to Managerial Statistics (4) *Designed for MBA candidates. Prereq: GEB 5805.* Basic concepts and methods of probability and statistics stressing applications in analyzing and solving business problems.
GEB 5805—Mathematical Methods and Their Applications to Business and Economic Analysis (5) *Required of MBA candidates.* Matrix algebra and calculus applied to business and economic analysis.
GEB 6705—Managerial Accounting (4) *Designed for MBA candidates. Prereq: ACC 5011, ECO 5111, STA 635B.* Periodic income measurement; relation of accounting techniques to control of business operations; effects of federal income taxes on management decisions.
GEB 6757—Managerial Quantitative Analysis (5) *Designed for MBA candidates. Prereq: CAP 5001, GEB 5756, GEB 6705.* Mathematical approaches and techniques applicable to the analysis and solution of managerial problems, with careful attention to problem formulation, mathematical analysis, and solution procedures. Involves substantial case work.
MAN 6108—Concepts and Methods in the Behavioral Sciences (5) *Prereq: MAN 3151.* Application of methodology and empirical findings from the behavioral sciences to business policies and practices.
MAN 6156—Human Behavior in Organizations (4) *Designed for MBA candidates. Prereq: MAN 5205.* Relationship between the individual administrator and supervisors, the employees supervised, and associates at a comparable level in the organization.
MAN 6721—Business Policy (4) *Designed for MBA candidates and taken last quarter before graduation. Prereq: all MBA foundation and advanced graduate sequence required courses.* Cutting across the entire field, this course approaches business policy making and administration from the top management point of view.
MAR 6716—Problems and Methods of Marketing Management (4) *Designed for MBA candidates. Prereq: MAR 5055.* Concepts and techniques for resolving marketing management problems with students gaining experience in making application.
STA 6357—Analysis of Decisions Under Uncertainty (3) *Designed for MBA candidates. Prereq: CAP 5001, GEB 5756,*

5805. Statistical methodology for managerial decision making, analysis of decision trees, measurement of risk preferences, use of probability and utility assessment routines in decision analysis. Involves substantial case work.

STA 6358—Statistical Analysis for Managerial Decisions (3) *Designed for MBA candidates. Prereq: CAP 5001, GEB 5756, GEB 5805.* Data analysis techniques useful for managerial problems with emphasis on difficulties in application and in interpretation of results. Includes experience in using computerized analytical procedures involving substantial case work.

CHEMICAL ENGINEERING
College of Engineering

GRADUATE FACULTY 1979-80

Chairman: J. C. Biery. *Graduate Coordinator:* R. J. Gordon. *Professors:* J. C. Biery; S. S. Block; R. W. Fahien; R. J. Gordon; F. P. May; J. P. O'Connell; D. O. Shah; M. Smutz; M. Tyner; R. D. Walker, Jr. *Associate Professors:* L. E. Johns, Jr.; D. W. Kirmse. *Assistant Professors:* H. H. Lee; G. B. Hoflund.

Graduate work for the Ph.D., M.E., and M.S. degrees in chemical engineering emphasizes these areas: (1) chemial engineering science—transport phenomena, fluid dynamics, thermodynamics, kinetics, statistical mechanics, microstructure of matter, and materials science; (2) chemical engineering systems—chemical reaction engineering, process control, process dynamics, optimization, separations processes; and (3) interdisciplinary chemical engineering—energy conversion and fuel cells, polymer science, microelectronics, process economics, biofluid mechanics, and bioengineering.

Beyond the Graduate School requirements, admission to graduate work in chemical engineering depends upon the qualifications of the student, whose record and recommendations are carefully and individually studied. During registration week each graduate student registering for the first time is counseled to develop an initial study program. The results of a brief examination covering the field of chemical engineering are also utilized by the graduate committee to guide the student. As a consequence, a program may include some undergraduate courses, if needed, to prepare for graduate course work.

The program of all students will involve research experience through the courses CHE 6905, 6971, or 7980. All new graduate students are expected to become proficient in computer programming during their first quarter on campus.

CHM 5272—The Organic Chemistry of Polymers (3) Classification of polymerization types and mechanisms from a mechanistic, organic point of view. Structure of synthetic and natural polymers and polyelectrolytes. Reactions of polymers. Practical synthetic methods of polymer preparation.

CHM 5511—The Physics and Physical Chemistry of Polymers (3)

ECH 5344L—Process Systems Laboratory (3) *Prereq: ECH 4323.* Measuring instruments, analog data manipulation and signal transmission in chemical process systems.

ECH 5708—Disinfection, Sterilization, and Preservation (3) Description of problems and need for these treatments; causative agents and their nature; nature and use of chemical and physical antimicrobial agents; specific problems and solutions.

ECH 6126—Thermodynamics of Reaction and Phase Equilibria (3) Methods for treating chemical and phase equilibria in multicomponent systems through the application of thermodynamics and molecular theory.

ECH 6146—Applied Statistical Mechanics (3) Methods of wave mechanics and statistical mechanics in engineering problems.

ECH 6147—Statistical Thermodynamics (3) Use of statistical mechanics to describe, predict, and correlate thermodynamic properties of compounds and mixtures.

ECH 6159—Advanced Seminar in Thermodynamics (2; max: 12) *Prereq: consent of instructor.* Research and current literature.

ECH 6206—Turbulent Transport Phenomena (3) *Prereq: ECH 6285.* Statistical theory of turbulence; correlation coefficients, energy spectra, isotropy and homogeneity, eddy diffusivity, and viscosity tensors. Boundary layer theory.

ECH 6207—Rheology (3) Analysis and characterization of rheological systems.

ECH 6208—Non-Newtonian Fluid Dynamics (3) Constitutive equations for non-Newtonian fluids (including viscoelastic substances) such as polymers, plastics, paints, and slurries.

ECH 6226—Heat Transfer Operations (3) Process design of equipment for heat transfer operations based on performance and economic optima.

ECH 6261—Introduction to Transport Phenomena (3) *Prereq: MAC 3224.* Basic equations of change for heat, mass, and momentum. Applications of conservation and flux equations for laminar and turbulent flow. Radiation, transfer coefficients, macroscopic balances.

ECH 6263—Advanced Transport Phenomena (3) *Prereq: ECH 6285.*

ECH 6269—Advanced Seminar in Transport Phenomena (2; max: 12) *Prereq: ECH 6285.* Research and current literature.

ECH 6285—Transport Phenomena (3) *Prereq: ECH 4504L or 6261.* Rigorous development of differential conservation equations and macroscopic balances. Non-Newtonian fluid dynamics, turbulence, boundary layer theory, transfer coefficients. Applications.

ECH 6286—Interfacial Transport Phenomena (3) *Prereq: ECH 6285.* Transport of heat, mass and momentum at interfaces. Heat and mass transfer coefficients, drag coefficient, and friction factor. Boundary layer theory.

ECH 6296—Transport Properties and Irreversible Thermodynamics (3) *Prereq: ECH 6126.* Molecular models and statistical mechanical methods useful in the prediction and correlation of viscosity, diffusivity, and thermal conductivity of fluids. Boltzmann equation, radial distribution function, cell models, absolute rate theory, corresponding states principle.

ECH 6306—Process Dynamics I (3) Dynamics and control of chemical processing systems, with emphasis on the dynamics of the unit operations and chemical reactions. Analog simulation of chemical processing systems.

ECH 6307—Process Dynamics II (3)

ECH 6326—Computer Control of Processes (3) *Prereq: ECH 6627.* Application of computers to control of chemical process, including the practical work involved in planning, organizing, managing, and executing a computer control project.

ECH 6328—Advanced Seminar in Process Control (2; max: 12) *Prereq: ECH 6306, 6307.* Research and current problems.

ECH 6406—Mass Transfer Operations (3) Process design of equipment for mass transfer operations based on performance and economic optima.

ECH 6413—Stagewise Separations Processes (3) Theory, design, and evaluation of separation processes such as distillation columns, extractors, and absorbers. Multicomponent-multistage distributions using rigorous digital computer computational methods. Real-time modeling for process automation.

ECH 6428—Advances in Separations Processes (3) *Prereq: ECH 6413.* Separations processes such as thermal diffusion, molecular distillation, fractional crystallization, absorption fractionation, and zone refining.

ECH 6506—Chemical Engineering Kinetics (3) Chemical kinetics useful in the design of chemical reactors; molecular collision theory, transition theory, homogeneous and heterogeneous reactions in gas, liquid, and solid phase with energy and mass transfer.

ECH 6526—Reactor Design and Optimization (3) Application of the principles of chemical kinetics to the design of batch, tubular flow, and tank flow reactors for optimum conditions.

ECH 6606—Process Economy Analysis (3) Economics in design and operation of chemical engineering equipment. Analysis for decision under conditions of certainty and uncertainty with applications of queuing, Monte Carlo, Markov Processes, and geometric and dynamic programming.
ECH 6626—Optimization Techniques (3) *Prereq: ECH 4842 or 6845.* Introduction to optimization techniques used in chemical process operations, process control, and systems engineering.
ECH 6627—Process Systems Optimization (3) Optimization of chemical processes and systems, with particular emphasis on dynamic programming and the maximum principle.
ECH 6646—Process Equipment Design (3) Unit operations, with emphasis on design of equipment to perform the service required, considering capacity, materials, equipment, and economics.
ECH 6647—Process and Plant Design (3) Techniques in the design of various complex chemical processes and plants.
ECH 6666—Design Techniques for Process Systems (3) Computer-aided process simulation and design. Decomposition techniques for system synthesis, analysis, and optimization.
ECH 6688—Advances in Process Systems Engineering (3) *Prereq: ECH 6666.*
ECH 6706—Chemical Energy Conversion (3) *Prereq: ECH 4504L or 6261.* Principles of thermodynamics and transport phenomena applied to the analysis and design of chemical energy conversion devices.
ECH 6707—Process Engineering (3) Application of chemical engineering operations and processing to industrial operations, such as petroleum refinery, manufacture of phosphates and fertilizers, and paper pulp processing.
ECH 6726—Interfacial Phenomena I(3) *Prereq: CHM 2043C, PHY 2052.* Air-liquid and liquid-liquid interfaces; surface-active molecules, adsorption at interfaces, foams, micro and macroemulsions, retardation of evaporation and damping of waves by films, surface chemistry of biological systems.
ECH 6727—Interfacial Phenomena II(3) *Prereq: CHM 2043C, PHY 2052.* Solid-gas, solid-liquid, solid-solid interfaces. Adsorption of gases and surface-active molecules on metal surfaces, contact angle and spreading of liquids, wetting and dewetting, lubrication, biolubrication, flotation, adhesion, biological applications of surfaces.
ECH 6747—Biochemical Engineering (3) Physical and chemical peculiarities of living organisms and their products. Material and energy transfer in living systems, unit operations in biological processes, and industrial biochemical engineering processes.
ECH 6766—Particulate Systems (3) Dynamics of fluid-solid, fluid-fluid, and biological systems; generalized population balances, macroscopic particle balance, kinetics of particle growth, birth and death functions, particle size determination. Crystallization, filtration, aerosols, entrainment, free molecule flow, and fluidized reactors.
ECH 6826—Engineering Properties of Organic Materials (3) Theoretical studies in molecular science. Correlation of composition, microstructure, and morphology of organic materials with macroscopic engineering properties.
ECH 6827—Macromolecular Materials (3) Formation, structure, and physical and chemical properties of macromolecules. Polymerization and processing methods. Commercial techniques in forming. Applications.
ECH 6844—Chemical Engineering Calculations (2) Calculation techniques used in advanced engineering problems.
ECH 6845—Models and Methods (3) *Prereq: ECH 6844.* Mathematical modeling and application to engineering problems of ordinary and partial differential equations, operational calculus, digital and analog computation techniques, complex variables, and integral equations.
ECH 6846—Multidimensional and Discrete Systems (3) Applications of the mathematics of multidimensional and discrete systems to engineering problems. Matrix methods. Calculus of finite differences. Linear programming.
ECH 6847—Applied Field Theory (3) Field equations of heat, mass, and momentum transport, and electromagnetic theory in orthogonal and nonorthogonal Euclidean and non Euclidean geometries. Covariant and convective differentiation of tensors. Surface geometries. Applications of Laplace, Hemholtz, diffusion, and wave equations.
ECH 6848—Applied Statistics and Probabilistic Systems (3) *Prereq: ECH 6845.* Applications of random variables and probability distributions; stochastic models, Monte Carlo techniques; statistical inference, sampling distributions, tests of significance, and experimental design.
ECH 6849—Advances in Numerical and Analytical Computation (3) *Prereq: ECH 6845, 6846.* Numerical and analytical techniques such as iterative matrix methods, hybrid computation, direct vector methods, functional analysis, and adaptive models.
ECH 6905—Individual Work (1-9) Individual engineering projects suitable for a nonthesis Master of Engineering degree.
ECH 6910—Supervised Research (1-5)
ECH 6926—Graduate Seminar (1; max: 16)
ECH 6936—Advanced Seminar in Chemical Engineering (2; max: 12) Research and current literature.
ECH 6937—Special Topics in Chemical Engineering I (1-6; max: 12) Separations processes, reactor design, applied molecular and kinetic theory, thermodynamics, particulate systems. Properties of chemical substances, transport phenomena, non-Newtonian fluid dynamics, turbulence, applied mathematics, computer science, biochemical and electrochemical engineering.
ECH 6939—Special Topics in Chemical Engineering III (1-6; max: 12)
ECH 6940—Supervised Teaching (1-5)
ECH 6969—Independent Proposal Preparation for Ph.D. Qualifying (1-3; max: 6)
ECH 6971—Research for Master's Thesis (1-15)
ECH 7938—Advanced Special Chemical Engineering Topics for Doctoral Candidates (1-6; max: 12)
ECH 7980—Research for Doctoral Dissertation (1-15)

CHEMISTRY
College of Liberal Arts and Sciences

GRADUATE FACULTY 1979-80

Chairman: N. Y. Öhrn. *Graduate Coordinator:* W. S. Brey, Jr. *Graduate Research Professors:* H. A. Laitinen; P. O. Löwdin; J. D. Winefordner. *Distinguished Service Professor:* H. H. Sisler. *Professors:* R. G. Bates; M. A. Battiste; T. Bieber;* W. S. Brey, Jr.; H. C. Brown; G. B. Butler; J. A. Deyrup; W. R. Dolbier, Jr.; R. D. Dresdner; R. J. Hanrahan; J. F. Helling; W. M. Jones; D. A. Micha; M. L. Muga; E. E. Muschlitz, Jr.; N. Y. Öhrn; G. A. Palenik; W. B. Person; J. R. Perumareddi;* G. E. Ryschkewitsch; P. Tarrant; M. T. Vala, Jr.; C. A. Vander Werf; W. Weltner, Jr.; J. A. Zoltewicz. *Associate Professors:* S. O. Colgate; T. E. Hogen Esch; G. H. Myers; C. E. Reid; G. M. Schmid; F. A. Schultz;* R. C. Stoufer. *Assistant Professors:* J. R. Eyler; A. Lombardo;* P. A. Snyder.*

**These members of the faculty of Florida Atlantic University are also members of the graduate faculty of the University of Florida and participate in the doctoral program in the University of Florida Department of Chemistry.*

The Department of Chemistry offers the Master of Science and Doctor of Philosophy degrees with specialization in analytical, organic, inorganic, or physical chemistry. The nonthesis degree Master of Science in Teaching is also offered with a major in chemistry.

New graduate students should have adequate undergraduate training in inorganic, analytical, organic, and physical chemistry. Normally this will include as a minimum a year of general chemistry which may include qualitative analysis, one quarter of quantitative analysis, one year of organic chemistry, one year of physical chemistry, and one quarter of advanced inorganic chemistry. Additional courses in instrumental analysis, advanced physical and organic chemistry are desirable. Deficiencies in any of these areas may be corrected during the first year of graduate study. Such

deficiencies are determined by a series of placement tests given prior to registration, and the results of these tests are used in planning the student's program.

The offerings CHM 6470, 6710, 6730, 6720, 6620, and 5157 constitute a series of core courses designed to provide graduate students with a well-rounded background in the broad area of chemistry. Doctoral candidates except those taking the chemical-physics option are required to complete CHM 6470 plus any two other core courses outside the major area, as well as one additional letter-graded 5000 or 6000 level chemistry course (two quarter hours or more) *not* in the major concentration area of the student (organic, inorganic, physical, or analytical), and not a laboratory technique course. Additional courses are taken upon recommendation of the student's supervisory committee or major professor, so that the total number of credits in courses acceptable for graduate credit is at least 42 hours. At least 24 quarter hours of these courses must be in 6000 level or higher courses in chemistry.

Candidates must serve not less than one year as teaching assistants. This requirement will be waived only when, in the opinion of the department, unusual circumstances justify such action.

A chemical-physics option is offered for students who will be doing research in areas of physical chemistry which require a strong background in physics. For this option, the requirement in chemistry is CHM 6470, plus one other core course and one non-major course. In addition, a minimum of 22 credits in 4000 level or higher physics courses, or a minimum of 12 such credits in physics and 12 in 4000 level or higher mathematics courses is required.

Candidates for the master's degree are required to complete any two core courses. The Master of Science degree in chemistry requires a thesis. The nonthesis degree Master of Science in Teaching is offered with a major in chemistry and requires a written paper of substantial length (30-50 pages) on an approved topic pertaining to some phase of chemistry, under the course CHM 6905.

CHM 5157—Analytical Processes (4) *Prereq: CHM 3120C and CHM 4411.* Fundamental principles of analytical chemistry, with emphasis on the non-instrumental aspects of the subject: statistics, sampling, standards, equilibrium theory, acids and bases, precipitation, complexation, electroanalysis, redox phenomena, analytical kinetics, and separation processes.

CHM 5235—Organic Spectroscopy (3) *Prereq: CHM 3211.* Advanced study of characterization and structure proof of organic compounds by spectral methods, including IR, UV, NMR and mass spectrometry.

CHM 5272—The Organic Chemistry of Polymers (3) *Prereq: CHM 3210, 3200, or equivalent.* Classification of polymerization types and mechanisms from a mechanistic organic point of view. The structure of synthetic and natural polymers and polyelectrolytes. Reaction of polymers. Practical synthetic methods of polymer preparation.

CHM 5300—Chemistry of Biological Molecules (4) *Prereq: CHM 3211 or 3216 and 4412 or 3401 or consent of instructor.* Mechanistic organic biochemistry. Emphasis on model systems, enzyme active sites, and physical and organic chemistry of biomacromolecules.

CHM 5413L—Advanced Physical Chemistry Laboratory (3) *Prereq: CHM 4412L.* Laboratory techniques used in experimental research; techniques of design and fabrication of scientific apparatus. Advanced experiments involving optical, electronic, and high vacuum equipment.

CHM 5511—The Physics and Physical Chemistry of Polymers (3) *Prereq: CHM 4411 or equivalent.* Structure, configuration, confirmation, and thermodynamics of polymer solutions, gels, and solids. Thermal, mechanical, optical, and rheological properties of plastics and rubbers.

CHM 5511L—Polymer Chemistry Laboratory (1) *Prereq or coreq: CHM 5511.* Laboratory experiments designed to accompany CHM 5511.

CHM 5514—Chemical Computations (3) *Prereq: CHM 4412 and knowledge of FORTRAN programming* Solution of difficult chemical problems in equilibrium, kinetics, and spectroscopy. Applications of computers to chemical research—control of experimental procedures and data reduction.

CHM 5626—Modern Inorganic Chemistry (3) *Prereq: CHM 3610 and CHM 4410.* Topics of current interest in inorganic chemistry, e.g., coordination chemistry, organometallic chemistry, inorganic polymers, nonclassical polyhedral compounds.

CHM 5631L—Inorganic Synthesis (3) *Prereq: CHM 3610.* Synthesis and characterization of inorganic compounds.

CHM 6140—Advanced Research Techniques in Chemistry (2-5; max: 12) A special topics course in advanced techniques employed in chemical research.

CHM 6153—Electrochemical Process (1-5) Principles of electrochemical methods, ionic solutions, and electrochemical kinetics.

CHM 6154—Chemical Separations (3) Theory and Practice of modern separation methods with emphasis on gas and liquid chromatographic techniques.

CHM 6155—Atomic and Molecular Spectroscopy (3) Principles of atomic and molecular spectrometric methods; discussion of instrumentation, methodology, applications.

CHM 6158L—Advanced Instrumental Analysis Laboratory (4) Principles of operation of instruments, optimization of instrumental conditions, and interpretation of instrumental data for qualitative and quantitative analysis.

CHM 6180—Special Topics in Analytical Chemistry (2; max: 12) *Prereq: Two courses of graduate level analytical chemistry.* Lectures or conferences covering selected topics of current interest in analytical chemistry.

CHM 6190—Analytical Chemistry Seminar (1) *Attendance required of graduate majors in, the analytical area. Prereq: graduate course in analytical chemistry.* Presentation of one seminar. May be repeated for credit. S/U option.

CHM 6225—Advanced Organic Chemistry (3) *Prereq: CHM 3211, 5235.* Advanced organic chemistry intended to present a useful interpretation of descriptive fact and unifying theory.

CHM 6226—Advanced Organic Chemistry (3)

CHM 6227—Advanced Organic Chemistry (3) *Prereq: CHM 6226.* Synthesis of complex organic molecules, with emphasis on recent developments in approaches and methods.

CHM 6242—Free Radical Reactions (2) *Prereq: CHM 6225, 6226, 6227.* Development and correlation of experimental methods, fact and theory of reactions involving organic free radicals.

CHM 6251—Organometallic Compounds (3) Properties of organometallic compounds, the nature of the carbon-metal bond, compounds of metals in groups 1, 2, 3, and 4, and transition metals.

CHM 6260—Physical-Organic Chemistry (2) Theory and application of physical methods in the study of the behavior of organic compounds.

CHM 6270—The Chemistry of Heterocyclic Compounds (2) *Prereq: CHM 6225, 6226, 6227.*

CHM 6271—Chemistry of High Polymers (2) Fundamental approach to the chemistry of high polymers, with emphasis on the mechanisms of polymerization reactions and the relationship of physical properties to chemical constitution.

CHM 6271L—High Polymer Chemistry Laboratory (2) *Prereq or coreq: CHM 6271.* Two three-hour laboratories per week or their equivalent. Preparation of representative members of the high polymer family and determination of their physical properties, methods of polymerization, and determination of fundamental polymer properties.

CHM 6381—Special Topics in Organic Chemistry (2) *Prereq: CHM 6225, 6226.* Chemistry of selected types of organic compounds, such as alkaloids, carbohydrates, natural products, steroids.

CHM 6390—Organic Chemistry Seminar (1) *Attendance re-*

quired of graduate majors in the organic area. Presentation of one seminar. May be repeated for credit. S/U.

CHM 6430—Chemical Thermodynamics (3) Energetics, properties of ideal and nonideal systems primarily from the standpoint of classical thermodynamics.

CHM 6440—Advanced Chemical Kinetics (3) *Prereq: CHM 6720 or equivalent.* Rates and mechanisms of chemical reaction.

CHM 6449—Photochemistry (3) *Prereq: CHM 6440 or 6720.* Experimental and theoretical aspects of chemical reactions induced by visible and ultraviolet radiation. Fluorescence and chemiluminescence.

CHM 6460—Kinetic Theory (3) *Prereq: CHM 6430.* Classical statistics, the Maxwell-Boltzmann distribution, molecular collision dynamics, elements of transport theory, virial theorem, intermolecular forces.

CHM 6461—Statistical Thermodynamics (3) *Prereq: CHM 6460.* Fundamental principles of statistical thermodynamics with applications to systems of chemical interest.

CHM 6470—Chemical Bonding and Spectra I (4) Basic methods and applications of quantum chemistry; atomic structure; chemical bonding in diatomic and polyatomic molecules. Brief introduction to molecular spectroscopy.

CHM 6471—Chemical Bonding and Spectra II (2; max: 4) *Prereq: CHM 6470.* Theory of symmetry and its chemical applications; semiempirical molecular orbital treatment of simple inorganic and organic molecules; further applications to inorganic and organic chemistry.

CHM 6480—Elements of Quantum Chemistry (3) *Prereq: CHM 6471.* Brief treatment of the Schrodinger equation, followed by a survey of applications to chemical problems.

CHM 6481—Quantum Theory of Matter I (3) *Prereq: CHM 6470 or PHY 5624.* Quantum mechanics of atoms; Hartree-Fock theory; interaction of radiation and matter; relativistic theory.

CHM 6482—Quantum Theory of Matter II (3) *Prereq: CHM 6481.* Diatomic and polyatomic molecules; symmetry properties and group theory.

CHM 6483—Quantum Theory of Matter III (3) *Prereq: CHM 6482.* Special topics in the quantum theory of atoms, molecules, and solids.

CHM 6490—Introduction to Molecular Spectroscopy (3) *Prereq: CHM 6471.* Molecular energy levels, spectroscopic selection rules; rotational, vibrational, electronic and magnetic resonance spectra of diatomic and polyatomic molecules.

CHM 6510—Physical Chemistry of Surfaces (3) Liquid-gas and solid-gas interface; adsorption and heterogeneous catalysis.

CHM 6512—The Physical Chemistry of Polymers (3) *Prereq: CHM 3211, 4410, 4411, and calculus through differential equations.* Configuration of polymer chains; solution properties of polymers and polyelectrolytes; solid state properties of polymers.

CHM 6513—Colloids (2) Methods of preparation and characteristics of colloidal dispersions; optical, kinetic, electrokinetic, and rheological properties of colloidal and macromolecular systems.

CHM 6515—Radiation Chemistry (2) *Prereq: CHM 6440 or 6720.* Chemical and physical effects caused by ionizing radiations. Kinetics and mechanism of radiation-induced reactions.

CHM 6520—Chemical Physics (3) Interatomic and intermolecular forces. Energy transfer and reaction in molecular collision processes. Computational aspects of scattering theory.

CHM 6580—Special Topics in Physical Chemistry (1-3; max: 15) Lectures or conferences covering selected topics of current interest in physical chemistry.

CHM 6590—Physical Chemistry Seminar (1) *Attendance required of graduate majors in physical chemistry. Prereq: graduate course in physical chemistry.* Presentation of one seminar. S/U option.

CHM 6620—Advanced Inorganic Chemistry (3) The crystalline state, acid-base, nonaqueous solvent, inorganic mechanisms.

CHM 6622C—Inorganic Preparations (5) Lectures and laboratory experiments showing the reactions and techniques used in the synthesis of inorganic compounds.

CHM 6623—Chemistry of the Metals (3) *Prereq: CHM 6471, 6730.* Relation of properties to atomic, molecular, and crystal structures.

CHM 6624—Chemistry of the Nonmetals (3) *Prereq: CHM 6730.* Relations of properties to atomic, molecular and crystal structures.

CHM 6680—Special Topics in Inorganic Chemistry (1-3; max: 15) Lectures or conferences on selected topics of current research interest in inorganic chemistry.

CHM 6690—Inorganic Chemistry Seminar (1) *Attendance required of graduate majors in inorganic chemistry. Prereq: graduate course in inorganic chemistry.* Presentation of one seminar. May be repeated for credit. S/U option.

CHM 6710—Applied Molecular Spectroscopy (4) Applications and comparison of methods in analysis and molecular structure determination.

CHM 6720—Chemical Dynamics (4) Basic concepts of rate laws, collision theory, and transition state theory; an introduction to reaction dynamics, structural dynamics, and quantitative structure-reactivity correlations.

CHM 6730—Chemical Transformations (4) Important types of chemical reactions and their application to organic and inorganic synthesis.

CHM 6905—Individual Problems, Advanced (3-5; max: 15) *Prereq: consent of faculty member supervising the work.* Double registration permitted. Assigned reading program or development of assigned experimental problem. S/U Option.

CHM 6910—Supervised Research (1-5)

CHM 6935—Chemistry Colloquium (1; max: 7) Topics presented by visiting scientists and local staff members. S/U.

CHM 6940—Supervised Teaching (1-5)

CHM 6971—Research for Master's Thesis (1-15)

CHM 7485—Special Topics in Theory of Atomic and Molecular Structure (3; max: 12) *Prereq: CHM 6483 or PHS 6227, or equivalent.* Mathematical techniques used in atomic, molecular, and solid-state theory. The one-electron approximation and the general quantum-mechanical many-body problem. Selected advanced topics.

CHM 7498—Theory of Atomic and Molecular Structure (3)

CHM 7980—Research for Doctoral Dissertation (1-15)

CHS 5110—Radiochemistry (3) *Prereq: CHM 3401 or CHM 4412 or consent of instructor.* Properties of radioactive nuclei, nature of radioactivity, nuclear structure, nuclear reactions, interaction of radiation with matter, chemical aspects of radioactivity, and applications of nucleonics to chemistry.

CHS 5110L—Radiochemistry Laboratory (2) *Prereq: CHM 3120C and 3401 or 4412, or consent of instructor.* Radioactivity detection, radiochemical separations and analyses, radiochemistry laboratory techniques, the practice of radiological safety, and tracer applications of radioisotopes in chemistry and other fields.

CHS 6120—Nuclear Chemistry (3) *Prereq: CHS 5110.* Radioactivity, nuclear structure, decay processes, nuclear reactions.

CIVIL ENGINEERING
College of Engineering

GRADUATE FACULTY 1979-80

Chairman & Graduate Coordinator: J. H. Schaub. *Professors:* H. K. Brooks; B. A. Christensen; D. U. Deere; T. D. Furman; B. E. Ruth; J. H. Schaub; J. H. Schmertmann; M. W. Self; B. D. Spangler; J. A. Wattleworth. *Associate Professors:* C. A. Collier; K. G. Courage; J. L. Davidson; J. L. Eades; C. O. Hays; G. Long; J. D. Rumble; W. H. Zimpfer. *Assistant Professors:* A. D. Koussis; J. M. Lybas.

The following graduate degrees are offered to prepare qualified students for the professional practice of civil engineering: Master of Engineering, Master of Science, Engineer, and Doctor of Philosophy. All degree programs include areas of concentration in the specialties of construction, hydraulics, soil mechanics and foundations, structures, and transportation engi-

neering. All degrees except the Ph.D. are available in a thesis or nonthesis program.

Programs designed to meet specific needs in civil engineering management and public works engineering are available within the various areas of concentration.

Resident graduate students are required to register for a minimum of three credits at one credit per quarter for ECI 6936. This credit is not applicable to the requirement for any degree. Nonthesis degree students must successfully complete a report of substantial engineering content for a minimum of three hours credit in ECI 6974. Minor or supporting work is encouraged from a variety of related or allied fields of study.

CES 5305—Design of Structural Systems (3) *Prereq: CES 5726, 5801.* Introduction to planning and design of structural systems, including building frames, bridge systems, space structures. Economic considerations in selection.

CES 5325—Design of Highway Bridges (3) *Prereq: CES 5726, 5801.* Design of highway bridges of reinforced and prestressed concrete and of steel; study of highway specifications; details of design, study of types and economics.

CES 5715—Design in Prestressed Concrete (3) *Prereq: CES 5726.* Principles of prestressed concrete, materials used in prestressed concrete, design of posttensioned and pretensioned beams for bending, bond and diagonal tension, review of existing specifications.

CES 5726—Design of Concrete Systems (3) *Prereq: CES 4705.* Ultimate strength analysis and design involving torsion with diagonal tension, members of irregular section, slabs, walls and footings. Building and bridge design. Introduction to prestressed concrete.

CES 5801—Design in Steel and Timber (3) *Prereq: CES 4607.* Continuation of CES 4607. Advanced design of connections. Theory and design of built-up members and plate girders. Design of timber members and connections.

CES 6106—Advanced Structural Analysis (3-6; max: 6) *Prereq: CES 3103, 4705, EGM 3400.* Approximate methods of analysis for structural members of variable section modulus, including problems on vibration, column buckling, beam-columns, beams on elastic supports.

CES 6108—Analysis of Statically Indeterminate Structures (1-6; max: 6) *Prereq: CES 3103, 4705.* Frames with variable moment of inertia; arch and ring analysis by elastic center and column analogy; matrix solutions; redundant trusses; moment and shear distribution.

CES 6136—Advanced Structural Laboratory (3) *Prereq: CES 3103, 4705.* Model studies and analysis. Applications to static and dynamic loadings. Mechanics of similitude and dimensional analysis. Vibration of beams; research studies.

CES 6146—Matrix Methods in Structural Analysis (3-6; max: 6) Matrix algebra relating to structural analysis. Development of matrix-method solutions for trusses and rigid frames. Problems programmed for the digital computer.

CES 6207—Topics in Structural Dynamics (3-6) *Prereq: CES 6106.* Analysis and design studies in selected topics such as dynamic response of structures, design for blast loads, and design for seismic forces.

CES 6516—Design of Framed Structures (3-6; max: 6) *Prereq: CES 6108, 6706.* Design of continuous trusses; secondary stresses; design of rigid frames; multistory frames, and arches.

CES 6526—Nonlinear Structural Analysis and Design (3-9; max: 9) *Prereq: CES 6108.* Rigid-plastic and multilinear analysis and design of beams and frames. Yield line theory of slabs. Deflection analyses of columns, frames, curved compression members and suspension systems, with design applications.

CES 6551—Design of Folded Plates and Shells (3-6; max: 6) *Prereq: CES 6108, 6706.* Analysis and design of folded plate, shell tank, and cable-supported structures.

CES 6616—Advanced Metal Structures (3) Behavior of structural materials under static, dynamic, and repeated loads. Effects of temperature. Materials problems in structural design.

CES 6706—Advanced Reinforced Concrete (3-6); max: 6) *Prereq: CES 4704.* Research in reinforced concrete and development of building code requirements; ultimate load theories and their application to design; special design problems.

CES 6716—Advanced Prestressed Concrete Design (3) *Prereq: CES 4704, 5715.* Design and limit analysis of prestressed concrete structural systems. Continuous beams, slabs, frames, composite members. Prestressed concrete reservoirs, structural systems in building construction, foundations, harbors.

ECI 5045—Numerical and Computer Methods in Civil Engineering (3-6) *Prereq: COP 3212.* Practice in machine solution of civil engineering problems, with emphasis on matrix algebra and numerical methods. Solutions of nonlinear systems of algebraic and differential equations.

ECI 5124—Civil Engineering Systems (4) Civil engineering applications of systems engineering and operations research techniques including models of scheduling, linear programming, queueing theory, and simulation.

ECI 5125—Construction Equipment and Procedures (3) *Prereq: ECI 4145 or consent of instructor.* Studies in equipment resource utilization in heavy construction. Theory and practice of mechanized construction procedures. Cost analysis. Optimizing crew and equipment.

ECI 5147—Construction Planning and Scheduling (3) *Prereq: ECI 4145.* Principles of planning, scheduling, organizing, and controlling construction projects. Studies in Critical Path Method and PERT, with resource leveling and financial scheduling. Linear programming applications in construction.

ECI 5157—Civil Engineering Project Feasibility Analysis (3) *Prereq: graduate standing or permission of instructor.* Theory and practice of feasibility studies for proposed civil engineering projects.

ECI 5166—Legal Aspects of Civil Engineering (3) Legal considerations encountered in professional practice, with particular emphasis on design and construction problems. Case studies.

ECI 5186—Public Works Planning (3) Engineering planning for public need, priority analysis, methods of financing, growth capital vs. maintenance. Location analysis.

ECI 5225—Problems in Hydraulics (3) *Prereq or coreq: ECI 4214 or consent of instructor.* Problem course covering application of methods presented in ECI 3213 and 4214. Emphasis on numerical methods and computer application.

ECI 5235—Open-Channel Hydraulics I (3) *Prereq: ECI 4214 or consent of instructor.* Classification of flow. Specific energy, critical depth, and hydraulic jump. Velocity and bed shear stress distributions. Backwater curves. Channel transitions. Spatially varied channel flow. Design of channel systems. Emphasis on steady flow.

ECI 5265—Hydraulic Motors and Pumps (3) *Prereq: ECI 4214 or consent of instructor.* Introduction to the theory of hydraulic motors, pumps, and transmissions.

ECI 5317—Stress-Deformation Analysis of Soil Media (3) *Prereq: ECI 4305 or consent of instructor.* Nature of soil-water systems; analysis of stress, strains, equations of states; viscoelastic behavior of soils; failure in soil media.

ECI 5325—Foundation Design II (3) *Prereq: CES 4705, ECI 4305.* Pile foundation design and installation, group capacity, drilled pier foundations, stability of excavations for deep foundations, braced cuts, and anchored bulkheads.

ECI 5335—Soil Exploration for Engineering Design (3) *Prereq: ECI 4314 or equivalent.* Methods of soil exploration; techniques of soil sampling and in situ testing; field measurement of soil deformations and pressures; load tests (emphasis on field work and demonstrations).

ECI 5625—Geohydrology (3) *Prereq: ECI 4214 or consent of instructor.* Elements of surface and subsurface hydrology. Darcy's law. Permeability and its determination in laboratory and field. Capillary forces. One-dimensional flow. Flow nets. Well hydraulics. Theis' recovery method. Numerical and experimental methods.

ECI 6153—Civil Engineering Practice (3) Advanced studies in the problems of civil engineering practice including social, legal, and environmental considerations as well as technical aspects. Case histories of civil engineering projects.

ECI 6154—Civil Engineering Operations (3) *Prereq: ECI 5124, 5147.* Applications of quantitative methods of decision making to major civil engineering problem areas.

ECI 6223—Computational Hydraulics I (3) *Prereq: ECI 4214*

or consent of instructor. Application of numerical methods to hydraulic engineering problems: dispersion, porous media flow, river mechanics, thermal diffusion, emphasis on the finite element method.

ECI 6224—Computational Hydraulics II (3-6) *Prereq: ECI 6223 or consent of instructor.* Application of numerical methods to hydraulic problems, computational aspects, class programming projects.

ECI 6227—Hydraulic Models and Analogs (3) *Prereq: ECI 4214.* Principles of hydraulic similitude. Special model laws and their limitations. Dimensional analysis. Distorted models with fixed or movable bed. Calibration of models; interpretation of model results. Electrical and laminar flow analogs. Applications.

ECI 6228—Hydraulic Measurements in Laboratory and Field (3) *Prereq: ECI 4214.* Modern hydraulic laboratory. Flumes and test rigs. Advanced methods for measurement of head, velocity, discharge, sediment transport. Auxiliary electronic equipment.

ECI 6233—River Mechanics (3) *Prereq: ECI 4214 or consent of instructor.* River and channel morphology. Flow in alluvial sand channels. Secondary currents. Dispersion and mixing in natural channels. Field techniques used in evaluating characteristics of natural channels.

ECI 6234—Hydraulics of Stratified Flow (3) *Prereq: ECI 4214, 5235.* Uniform and nonuniform flow in multilayered systems, including hydraulic jumps and saline wedges. Oscillatory motion and interfacial mixing. Continuous-density gradients. Diffusion.

ECI 6236—Open-Channel Hydraulics II (3) *Prereq: ECI 5235.* Unsteady open-channel flow. Equation of motion. Method of characteristics. Surge formation. Dam-break problem. Flood waves. Rating curves and expressions for discharge.

ECI 6237—Sediment Transport (3) *Prereq: ECI 5235.* Alluvial water courses. Critical shear stress and stable channels. Modes of sediment motion and bed formation. Suspended load. Bedload formulas and entrainment at the bed. Transport in closed conduits. Natural rivers. Meanders.

ECI 6238—Hydraulic Transients (3) *Prereq: ECI 4214.* Unsteady pipe flow. The surge tank. Water-hammer analysis. Numerical and graphical methods. Digital programming of unsteady flow situations.

ECI 6316—Advanced Soil Mechanics (3-9; max: 9) *Prereq: ECI 4314.* Application of soil mechanics to the design and construction of buildings, foundations, earth structures, and highways.

ECI 6326—Advanced Foundations (3 or 6; max: 6) *Prereq: ECI 4305, 6108, 6316.* Special foundations using most recent information from soil mechanics and structural analysis. Pile foundations, mats, retaining walls and structures such as piers.

ECI 6346—Soil Dynamics (3-6) Dynamic principles; lumped systems; phase plane solution; elastic half-space theory; soil behavior under dynamic loading; foundation design problems under impulse, earthquake, pavement, and steady-state vibrations.

ECI 6356—Theory and Practice of Soil Compaction (3) *Prereq: ECI 4305, 4314.* Theories of compaction as applied to laboratory and field compaction. Properties of compacted soils. Factors influencing field compaction. Compaction control.

ECI 6416—Properties, Design and Control of Concrete (4) *Prereq: ECI 3403.* Portland cement and aggregate properties relating to design, control, and performance of concrete.

ECI 6426—Bituminous Materials (4) *Prereq: TTE 4104.* Engineering analysis of strength and deformation mechanisms for asphalt and asphalt-aggregate systems; sampling and testing.

ECI 6436—Structure and Engineering Properties of Soils (3-9; max: 9) Factors influencing mechanical properties of soils; effective stress, cohesion and friction, shear-consolidation interaction, pore pressures, creep and dynamic effects. Research and laboratory instruction.

ECI 6575—Air Photo Interpretation; Engineering Applications (3) *Prereq: ECI 5335 or TTE 5006.* Interpretation of aerial photography for the evaluation and planning of transportation systems and selection of desirable sites for construction of civil engineering projects.

ECI 6576—Air Photo Interpretation: Terrain Analysis (4) *Prereq: ECI 6575.* Interpretive techniques used to identify soils, rocks, and engineering problems from aerial photography.

ECI 6616—Groundwater Hydraulics (3) *Prereq: ECI 5625.* Laminar flow through porous isotropic and anisotropic media. Two-dimensional flow problems and potential theory methods. Three-dimensional flow. Multiple phase flow. Salt water intrusion. Dispersion. Turbulent groundwater flow. Transient flow.

ECI 6905—Special Problems in Civil Engineering (1-9; max: 15) Studies in areas not covered by other graduate courses.

ECI 6910—Supervised Research (1-5; max: 5)

ECI 6936—Graduate Civil Engineering Seminar (1; max: 3)

ECI 6940—Supervised Teaching (1-5; max: 5)

ECI 6971—Research for Master's Thesis (1-15)

ECI 6974—Master of Engineering or Engineer Degree Report (1-9) Individual work culminating in a professional practice-oriented report suitable for the requirements of the Master of Engineering or Engineer degree. Three credits only are applicable toward the requirements of each degree.

ECI 7980—Research for Doctoral Dissertation (1-15)

ENV 5625—Advanced Water Resources Engineering (3) *Prereq: ECI 5235 or consent of instructor.* The hydrological cycle. Hydrographs. Stormwater management in urban areas. Flow analysis and design principles for hydraulic structures and systems. Optimum design and operation of hydraulic structures and systems.

TTE 5006—Transportation Systems Planning (4) *Prereq: consent of instructor.* Review of transportation engineering systems, studies, and plans.

TTE 5105—Highway Design (3) *Prereq: TTE 4104 or consent of instructor.* Design of flexible and concrete pavements.

TTE 5215—Traffic Engineering Characteristics (4) *Prereq: consent of instructor.* Characteristics of drivers, vehicles, stream flow; volume, accident, and speed studies; traffic flow theories, intersection capacities.

TTE 5257—Traffic Control Systems (4) *Prereq: TTE 5215 or consent of instructor.* Pretimed signal systems. Traffic-actuated controllers. Traffic responsive systems. Electronic traffic detectors. Computer control of traffic. Automated traffic data collection techniques.

TTE 5701—Geometric Design of Transportation Facilities (4) *Prereq: TTE 4104 or consent of instructor.* Philosophical considerations in planning and design; design controls and criteria; elements of design; cross section elements; intersection design; freeway design; interchange design. Design projects.

TTE 6106—Advanced Highway Engineering (3) *Prereq: TTE 4104.* Highway soil stabilization, behavior of granular and stabilized highway materials.

TTE 6107—Highway Safety Analysis (3) *Prereq: TTE 5215.* Accident-reporting systems, statistics and characteristics of accidents, accident reconstruction and investigation procedures, factors involved in highway accidents, accident reduction and effects minimization.

TTE 6256—Traffic Engineering Operations and Analysis (4) *Prereq: TTE 5215.* Operational techniques used to optimize traffic flow including control systems. Maintenance operations. Freeway operations and control. Intersection channelization.

TTE 6267—Traffic Flow Theory (4) *Prereq: TTE 5215.* Macroscopic and microscopic traffic flow models, simulation, traffic system and network models, freeway corridor models.

TTE 6306—Transportation Systems Technology (4) *Prereq: consent of instructor.* Capacity, speed, and cost of public mass transportation systems, analysis and simulation of alternate transportation systems; new systems.

TTE 6307—Freeway Design and Operations (4) *Prereq: TTE 5215.* Operational characteristics of freeway systems. Geometric design configurations and effect on operation. Advanced analysis techniques. Freeway surveillance and control.

TTE 6516—Transportation Planning Decisions (3) Finance and administration, highway needs analysis, economics of location, highway planning studies.

TTE 6526—Airport Planning and Operations (3) *Prereq: TTE 5257.* Configuration, ground movements, baggage movements, parking, aircraft delay analysis, airport access, simulation of airport operations.

TTE 6606—Urban Transportation Models (4) *Prereq: TTE*

5006. Current mathematical models of traffic planning and urban activity. Trip generation, distribution and assignment. Modal split.

CLASSICS
College of Liberal Arts and Sciences

GRADUATE FACULTY 1979-80

Chairman: G. L. Schmeling. *Professor:* G. L. Schmeling. *Associate Professors:* K. V. Hartigan; D. G. Miller.

The department offers a program leading to the Master of Arts with a major in Latin, which may be combined with a minor in Greek, history, or philosophy.

LAT 6840—History of the Latin Language (5)
LNW 5905—Special Study in Latin (4)
LNW 6902—Special Study in Latin Literature (5; max: 15) Sample topics: Horace, Juvenal, Roman comedy, Roman historians.
LNW 6905—Individual Work (3-5; max: 15) Readings, conferences and reports. Subjects in language, literature, and civilization for which there are no special course offerings.
LNW 6910—Supervised Research (1-5)
LNW 6940—Supervised Teaching (1-5)
LNW 6971—Research for Master's Thesis (1-15)

CLINICAL PSYCHOLOGY
College of Health Related Professions

GRADUATE FACULTY 1979-80

Chairman: N. W. Perry, Jr. *Graduate Coordinator:* H. C. Davis. *Professors:* B. Barger; E. Cohen; L.D. Cohen; H.C. Davis; J.R. Goldman; M. Harrower *(Emeritus);* K. M. Heilman; W. L. Mealiea, Jr.; B. G. Melamed; M. E. Meyer; N. W. Perry, Jr.; P. Satz; A. S. Schumacher *(Emeritus).* Associate Professors: *R. K. Blashfield; R. K. Hornberger; W. C. Rasbury; G. A. Rekers; W. J. Rice; V. D. Van De Riet.* Assistant Professors: *C. D. Belar; E. B. Fennell; M. K. Goldstein; S. B. Johnson; M. H. McCaulley.*

The Department of Clinical Psychology is a graduate program department in the College of Health Related Professions. The department's programs are its predoctoral clinical psychology program leading to the Ph.D. degree in psychology; the Psychology Clinic, a teaching and service unit of the J. Hillis Miller Health Center's Teaching Hospital and Clinics; a predoctoral internship program, and postdoctoral studies and research. The master's degree is offered as part of the doctoral program studies.

The clinical psychology program involves academic ties with other colleges and departments within the University and with the Veteran's Administration training and service programs.

Courses offered by the faculty of the department are listed below. Progress of the program is determined by departmental policies which are consistent with American Psychological Association accreditation standards.

Admission to the department is through appropriate application to the department's admissions committee. A bachelor's degree, along with one undergraduate course in both experimental psychology and statistics and courses in at least three of the following areas: developmental, learning, perception, personality, physiological and social, is generally adequate preparation for graduate admission.

CLP 6375—Introduction to Clinical Psychology (4) *Prereq: admission to CLP program.* Seminar on issues and concepts concurrent with field observation and participation.
CLP 6407—Psychological Treatment I (4) *Prereq: admission to CLP program or consent of instructor.* Current dynamic and personality theories, practices, and related research in psychotherapy.
CLP 6417—Psychological Treatment II (4) *Prereq: admission to CLP program or consent of instructor.* Current behavioral theories, practices, and related research.
CLP 6437—Behavioral Assessment (4) *Prereq: admission to CLP program or consent of instructor.* Research, theory, and basic procedures including observational and interview techniques.
CLP 6441—Intellectual Assessment (4) *Prereq: admission to CLP program or consent of instructor.* Research, theory, and basic procedures in assessing intellectual functions.
CLP 6448—Personality Assessment (4) *Prereq: admission to CLP program or consent of instructor.* Research, theory, and basic procedures including objective and projective techniques.
CLP 6449—Life History Research in Psychopathology (4) *Prereq: CLP 6497 or consent of instructor.* Recent and longitudinal developments in life history approaches to psychopathology and related behavioral disorders.
CLP 6497—Psychological Disturbances of Adults (4) *Prereq: admission to CLP or PSY program or consent of instructor.* Theories and related research to etiology, clinical description, and diagnosis with implications for treatment.
CLP 6526—Introduction to Clinical Research and Design (4) *Prereq: admission to CLP or PSY program or consent of instructor.* Survey emphasizing both laboratory and clinical experiment methodology; computer data analysis techniques employed.
CLP 6905—Individual Work (1-5; max: 15) Reading or research in areas of clinical psychology.
CLP 6910—Supervised Research (1-5)
CLP 6940—Supervised Teaching (1-5)
CLP 6943—Practicum in Clinical Psychology (6; max: 12) *Prereq: CLP 6375, 6437, 6441, 6448, 6497, DEP 6216.* Supervised training in appropriate work settings. S/U.
CLP 6947—Advanced Practicum in Clinical Psychology (1-6; max: 12) *Prereq: consent of Clinical Director.* Designed for individual with special interests and needs. S/U.
CLP 6971—Research for Master's Thesis (1-15)
CLP 7348—Theory and Practice of Psychological Consultation (4) *Prereq: CLP 6375, CYP 6709.* Includes multiple roles, intervention strategies used by consultants as agents of change. Field experience in community settings.
CLP 7404—Special Issues, Methods, and Techniques in Psychological Treatment (4; max: 8) *Prereq: CLP 6375, 6407, 6417 or consent of instructor.*
CLP 7406—Psychodynamic Theory (4; max: 8) *Prereq: CLP 6375, 6407, 6417 or consent of instructor.* Emphasis on disturbed adolescents and young adults.
CLP 7408—Gestalt Therapy and Techniques (4; max: 8) *Prereq: CLP 6375, 6407, 6417 or consent of instructor.* Experimental didactic and other humanistic approaches to personality theory and psychotherapy.
CLP 7409—Marital Dysfunction (4) *Prereq: CLP 6375, 6407, 6417.* Issues, problems and techniques of psychotherapy with couples.
CLP 7427—Neuropsychological Assessment (4) *Prereq: CLP 6441, 6448, PSB 6067.* Research, theory and basic procedures.
CLP 7438—Selected Methods in Clinical Assessment (4; max: 8) *Prereq: CLP 6437, 6441, 6448.*
CLP 7468—Psychological Treatment with Groups (4) Current theories and practices of group therapy as a form of psychological treatment. Exploration of group therapy intervention techniques.
CLP 7488—Clinical Treatment of Adolescents (4) *Prereq: CLP 6375, 6407, 6417.* Application of a variety of treatment techniques.
CLP 7942—Practicum in Behavior Therapy (4) *Prereq: CLP 6375, 6407, 6417.* Application of behavioral treatment techniques to actual patient and client needs.
CLP 7936—Medical Psychology (4) *Prereq: admission to CLP program or consent of instructor.* Seminar on the relevance of psychological research and clinical practice for medical patient populations.

CLP 7938—Forensic Psychology (4) Concerns with issues of the interface between law and psychology relating to the psychologist's function in this role.
CLP 7949—Internship (5) *Prereq: admission to candidacy for the doctorate, successful completion of the qualifying examination and consent of the Clinical Director.* Reading assignments and conferences. Must include 1500 work hours; designed as a three quarter sequence.
CLP 7980—Research for Doctoral Dissertation (1-15)
CYP 6709—Theory and Research in Community Clinical Psychology (4) Principles, consultation, mental health education, early identification, intervention. Research methods and current literature.
CYP 7308—Advanced Community Intervention (4) *Prereq: CLP 6375, CYP 7308 or consent of instructor.* Theory and strategy methods developed specifically for utilization in practice of community clinical psychology.
DEP 6216—Psychological Disturbances of Children (4) *Prereq: admission to CLP or PSY program or consent of instructor.* Stresses both affective and cognitive.
DEP 7217—Minimal Brain Dysfunction (4) *Prereq: admission to CLP or PSY program or consent of instructor.* Theory, research, and applications in clinical psychology.
DEP 7408—Clinical Psychology of Aging (4) *Prereq: permission of instructor.* A developmental sequence that focuses on the psychopathology, neuropsychology and treatment issues confronting the clinician dealing with an aged population.

COASTAL AND OCEANOGRAPHIC ENGINEERING
College of Engineering

GRADUATE FACULTY 1979-80

Acting Chairman and Graduate Coordinator: D. M. Sheppard. *Professors:* T. Y. Chiu; E. Partheniades; O. H. Shemdin. *Associate Professors:* D. M. Sheppard; Y. H. Wang. *Assistant Professor:* A. J. Mehta.

The Department of Coastal and Oceanographic Engineering offers the Master of Engineering, Master of Science, and Engineer degrees. The Doctor of Philosophy degree is offered by other departments in the College of Engineering in cooperation with the Department of Coastal and Oceanographic Engineering.

Areas of specialization include coastal structures, wave mechanics, littoral processes, estuarial hydromechanics, and oceanographic engineering.

The following *Engineering Common Courses* are available for graduate major credit: EGM 5816—Intermediate Fluid Dynamics; EGM 6811—Theory of Fluid Flow I; EGM 6812—Theory of Fluid Flow II; EGM 6813—Theory of Flow III; EGM 6835—Boundary Layer Theory; EGM 6834—Theories of Turbulent Analysis I; EGM 6322—Principles of Engineering Analysis II; EGM 6323—Principles of Engineering Analysis III; EGM 6324—Principles of Engineering Analysis IV; EGM 6325—Principles of Engineering Analysis V; EGM 6341—Numerical Methods of Engineering Analysis I; EGM 6342—Numerical Methods of Engineering Analysis II; EEL 5719—Digital Filtering.

EOC 5052—Ocean Engineering (4) Basic oceanography; underwater instrumentation; floating platforms and buoys; fixed structures; submersibles; materials and testing; operations offshore.
EOC 5180—Stochastic Processes for Coastal and Ocean Engineers (4) *Prereq: undergraduate calculus sequence; knowledge of fluid mechanics.* Principles of spectral analysis. Linear systems. Cross spectral analysis and its applications to marine problems. Threshold crossing problems. Linear and nonlinear response of marine structures to random seas. Prediction of design extreme values.
EOC 5310—Acoustics in Fluids (4) *Prereq: consent of instructor.* Propagation of acoustics in fluids. Electroacoustic transducers. Acoustic characterization of targets. Laboratory.
EOC 5318—Introduction to Ocean Chemistry for Engineers (4) *Prereq: CHM 2042, MAC 3313, or consent of instructor.* Chemical composition of sea water, transport and mixing processes, sampling techniques and methods of analysis, wave damping due to surface films, dispersion of oil films, chemical properties of sediments.
EOC 5860—Harbor Engineering (4) *Prereq: OCE 4016 or consent of instructor.* Principles of design in harbors; wave penetration, harbor oscillation; movement of sediments and pollutants; design in harbor structures; principles of harbor operations.
EOC 6196—Littoral Processes (4) *Prereq: OCP 6165.* Longshore currents and sediment transportation by waves and wind; effects of groins, jetties, and other coastal structures on littoral processes.
EOC 6430—Coastal Structures I (4) *Prereq: OCP 6165.* Design principles for breakwaters, jetties and piers, shore protection, harbor design, offshore structures.
EOC 6431—Coastal Structures II (4) *Prereq: OCP 6165, EOC 6430.* Case studies in the design and performance of coastal and offshore engineering construction.
EOC 6850—Simulation Techniques (4) Similitude laws, analog and numerical modeling, studies of littoral drift, harbor resonance, wind-driven circulation, storm surge, wave generation.
EOC 6905—Individual Study in Coastal and Oceanographic Engineering (1-9; max: 18)
EOC 6910—Supervised Research (1-5)
EOC 6932—Selected Field and Laboratory Problems (3-8) Field investigations employing modern research techniques and instrumentations; correlation of measurements with predictions.
EOC 6934—Advanced Topics in Coastal and Oceanographic Engineering (1-6) Wave forces, internal waves, sediment transport; surges in basins; instrumentation; advanced data analysis techniques; nonlinear wave mechanics; ship waves.
EOC 6939—Graduate Seminar (1; max: 12) Discussions and presentations in graduate study and research. S/U.
EOC 6940—Supervised Teaching (1-5)
EOC 6971—Research for Master's Thesis (1-15)
OCP 6056—Physical Oceanography (4) *Prereq: calculus and differential equations.* Historical introduction. Structure of the ocean basins. Physical and chemical properties of sea water and property distributions. Heat budget, dynamics of ocean movement and oceanic waters.
OCP 6165—Ocean Waves I: Linear Theory (4) *Prereq: courses in calculus, differential equations and fluid dynamics.* Ocean wave classification; solution of the linearized boundary value problem; simple harmonic waves; shoaling effects; internal waves.
OCP 6167—Ocean Waves II: Nonlinear Theory (4) *Prereq: OCP 6165.* Perturbation development of nonlinear water wave theories. Regions of validity of various theories. Dynamics and kinematics of nonlinear wave trains composed of single and multiple fundamental components.
OCP 6169—Random Sea Analysis (4) *Prereq: OCP 6165.* Ocean wave spectra; measurement, analysis, and application. Systems approaches to calculation of responses of linear and nonlinear coastal and oceanographic processes.
OCP 6295—Estuarial Hydromechanics and Engineering I (4) *Prereq: OCP 6165.* Tidal theory. Analytical and numerical methods for computation of one- and two-dimensional propagation of tides and storm surges in estuaries and bays; method of characteristics; hydraulic bore; seiches; solitary wave.
OCP 6296—Estuarial Hydromechanics and Engineering II (4) *Prereq: ECI 6234, OCP 6295.* Salinity intrusion in tidal estuaries; diffusion dispersion entrainment and mixing; analytical and numerical methods for predicting salinity intrusion and distribution of pollutants; laboratory exercises.
OCP 6297—Estuarial Hydromechanics and Engineering III (4) *Prereq: OCP 6296.* Estuary shoaling and dredging practices; tidal energy; model investigations and study of selected case histories.
OCP 6555—Air-Sea Interaction I: Microscale (4) *Prereq: OCP 6165.* Equations of motion and stresses at the air-sea interface; the classical instability theory; recent theories of en-

ergy transfer from air to water; thermodynamic considerations; the growth of waves; wave forecasting.

OCP 6556-Air-Sea Interaction II: Macroscale (4) *Prereq: basic courses in calculus and fluid mechanics.* Composition and properties of the marine atmosphere; air-sea fluxes and energy transfer; global heat and water budget; tropical disturbances, large-scale momentum exchange.

COMMUNICATIVE DISORDERS
Colleges of Health Related Professions & Liberal Arts and Sciences

GRADUATE FACULTY 1979-80

Chairman & Graduate Coordinator: K. R. Bzoch. *Professors:* K. R. Bzoch; L. C. Hammer. *Associate Professors:* F. J. Kemker; W. N. Williams. *Assistant Professors:* W. H. Cutler; L. L. LaPointe; E. Scroggie, Jr.

The faculty of communicative disorders is primarily responsible for interdisciplinary clinical teaching and research for the Colleges of Health Related Professions, Medicine, Dentistry, and Nursing in aspects of speech pathology and audiology related to the professional degree programs of these colleges.

Courses and degrees in speech pathology and audiology are offered by the Department of Speech in the College of Liberal Arts and Sciences. The descriptive listings of courses in speech pathology and audiology may be found under Department of Speech in the undergraduate and graduate catalogs. The following courses are customarily taught by faculty of the College of Health Related Professions who also hold appointments in the Department of Speech.

HSC 6905—Individual Study in Health Related Professions (4)
LIN 5711L—Laboratory Study of Emergent Language Behavior (4)
SPA 5242—Communicative Disorders Related to Cleft Lip and Palate (4)
SPA 6231—Seminar in Speech Pathology and Audiology: Cerebral Palsy (2)
SPA 6245—Seminar in Speech Pathology and Audiology: Cleft Palate (2)
SPA 6313—Seminar in Audiology: Diagnostic Procedures for Peripheral Hearing Disorders (2)
SPA 6345—Seminar in Audiology: Hearing Aids (2)

COMPUTER AND INFORMATION SCIENCES
Colleges of Business Administration, Engineering, and Liberal Arts and Sciences

GRADUATE FACULTY 1979-80

Chairman: R. W. Elliott. *Graduate Coordinator:* J. D. Brownsmith. *Graduate Research Professor:* J. T. Tou. *Professors:* R. W. Elliott; R. G. Selfridge; S. Y. W. Su. *Associate Professor:* F. D. Vickers. *Assistant Professor:* J. D. Brownsmith.

The Department of Computer and Information Sciences offers the Master of Science degree. Students may enroll in any one of three colleges—Business Administration, Engineering, or Liberal Arts and Sciences.

Areas of specialization include computer organization, information systems, and software systems. These specializations permit study in a wide range of areas including programming languages, database management, software engineering, graphics, pattern recognition, business information systems, operating systems, compilers, performance measurement, artificial intelligence, etc.

Applications for admission must be approved by both the department and the college in which the student wishes to enroll. Students without undergraduate degrees in Computer and Information Sciences may be admitted to the program but be required to take a program of specified courses for which they will not receive graduate credit. These remedial programs will typically involve 12 hours of course work. Students who wish to obtain a degree from a college other than the one from which they received their undergraduate degrees will be required to do additional remedial work specified by the department's graduate coordinator and approved by the new college.

All students must satisfy a core requirement by completing five specified graduate level courses (18 credits) or their approved equivalents. Students must maintain an average of at least 3.0 on the core courses, and no more than one course out of the five may have a grade below B. An additional 17 credits of course work must be taken which includes six to eight graduate level credits in computer information sciences, courses designed for a selected area of specialization, and at least nine credits from courses offered by some other department in the college in which the student is enrolled. All students are also required to take a one-credit seminar and write a thesis. A maximum of nine hours may be credit for thesis work. No foreign language is required.

The Dean of the Graduate School, acting on the recommendations of the Chairman of the Computer and Information Sciences Department and the Dean of the College in which the student is enrolled, will appoint a supervisory committee for each student consisting of two members of the Computer and Information Science graduate faculty and one member of the graduate faculty of some other department from the College.

The Center for Information Research, the Database Management Research and Development Center, and a number of other campus research centers provide opportunities for students enrolled in the program.

CAP 5722—Computer Graphics (4) *Prereq: COP 3550.* Displays, storage, and generation. Interactive vs. passive graphics. Analog vs. digital graphic storage. Pattern recognition. Projections and the hidden line problem.

CAP 6624—Advanced Computer Applications (3) *Prereq: CDA 3101, COP 3530 or equivalent.* A survey of state-of-the-art computer applications including natural language processing, computer vision systems, image processing, robotics, modeling and knowledge representation, and intelligent machines.

CDA 6107—Microprogramming (4) *Prereq: CDA 4041/EEL 4713C or equivalent.* The function and design of microprogrammable control units. Typical instruction sets and their microcode implementation. "High-level" microprogramming languages. Efficient algorithms for performing arithmetic operations. Emulation and interpretation. Case studies.

CIS 5041—Information Retrieval (4) *Prereq: COP 3530.* The structure and operation of information retrieval systems.

CIS 6122—Data Base Management Systems (4) *Prereq: COP 3530, 4020, or equivalent.* An introduction to systems and procedures for managing large computerized data bases.

CIS 6123—Data Base Design and Implementation (3) *Prereq: CIS 6122; a working knowledge of data base system architecture, data models, sublanguages, storage structures and access techniques, file organizations, and access methods.* A study of systematic, integrated data base design and im-

plementation including the subjects of corporate requirement analysis, semantic modeling, view integration, data mapping to DBMS schema and subschema, physical data base design and evaluation, and data base restructuring and conversion. A term project is required.

CIS 6935—Graduate Seminar (1) *Prereq: graduate status in CIS.* Presentations by graduate students, faculty members, and visiting researchers.

CIS 6937—Special Topics in CIS (1-5) *Prereq: vary depending on topics.* Topics vary. In-depth discussions of recent developments in computer or information sciences.

CIS 6971—Research for Master's Thesis (1-9)

COP 5622—Operating Systems (4) *Prereq: COP 4620.* The concepts and techniques of efficient management of all system resources.

COP 5630—Software Engineering (4) *Prereq: COC 3110 or EIN 3114.* Principles of software design and engineering. Includes topics in project organization, specification techniques, reliability measurement, documentation.

COP 5641—Computer Language Translators (4) *Prereq: COP 4644.* Advanced concepts and techniques in language compilation and interpretation.

COP 6500—Survey of Programming Languages (3) *Prereq: CDA 3101, COP 3530, or equivalent.* Survey of higher-level programming languages emphasizing language features and implementation techniques.

CRM 6200—Computer System Measurement and Evaluation (4) *Prereq: COP 5622 and basic course in probability and statistics.* Presents computer measurement tools and techniques, analytical techniques for computer system modeling and evaluation, simulation techniques, performance measurement and evaluation in performance improvement problems, and performance evaluation in computer comparison and selection problems.

COUNSELOR EDUCATION
College of Education

GRADUATE FACULTY 1979-80

Chairperson: P. J. Wittmer. *Graduate Coordinator:* L. C. Loesch. *Distinguished Service Professor:* R.O. Stripling. *Professors:* D. Avila; P. W. Fitzgerald; G. Greenwood; T. Landsman; R. D. Myrick; H. C. Riker; P. G. Schauble; B. L. Sharp; B. Soldwedel;* P. J. Wittmer. *Associate Professors:* A. G. Cranney; M. K. Dykes; T. Goodale; R. Jester; J. Larsen; L. C. Loesch; J. H. Lombana;* R. M. McDavis; M. R. McMillin; J. H. Pitts; J. P. Saxon; E. L. Tolbert. *Assistant Professors:* E. S. Amatea; R. M. Bollet;† T. W. Clawson;* R. R. Kavanaugh;† W. M. Parker; L. E. Percy;† J. H. Pitts; J. L. Resnick; G. D. Seiler.

These members of the faculties of the University of North Florida (*) and the University of Central Florida (†) are also members of the graduate faculty of the University of Florida and participate in the doctoral program in the University of Florida Department of Counselor Education.

Programs leading to the degrees Master of Education (awarded only upon completion of the Specialist in Education degree), Specialist in Education, Doctor of Education, and Doctor of Philosophy are offered through this department. Program areas include (1) school counseling and guidance (Ed.S., doctorate), and (2) school psychology (Ed.S., doctorate), for positions in elementary, middle, and secondary schools; (3) student personnel in higher education (Ed.S, doctorate) for positions in community colleges, vocational-technical schools, colleges, universities and other post-secondary school settings; (4) agency, correctional, and developmental counseling (Ed.S.); (5) counseling psychology (Ph.D.) in cooperation with the Department of Psychology with course work being taken through both departments; and (6) counselor education (doctorate).

Family, marital, pastoral counseling, and counseling older adults, minorities, and women are possible emphases in various program areas listed above. Vocational development and research are integral parts of preparation in all programs listed above.

Candidates for admission are urged to complete a course in basic statistics before entering the program. In any event, this requirement must be met during the first quarter of graduate work.

Study for the Ed.D. degree in counselor education at the University of Florida by qualified master's degree recipients at the University of North Florida and at the University of Central Florida is facilitated by a cooperative arrangement in which appropriate members of the faculty of UNF and UCF are members of the graduate faculty of the University of Florida.

EGC 6005—Principles of Guidance: The Helping Relationship (4) *Prereq or coreq: EDF 6355 or PPE 5055.*

EGC 6045—Counseling With Children (4) *Prereq: EGC 6416, 6447, EDF 6113, or equivalent.*

EGC 6054—Problems in Personnel Work (3-6; max: 10) *Seminar in special problems in personnel work arranged by department.*

EGC 6055—Student Personnel Services in Higher Education (4) *Prereq: EGC 6005, 6057.*

EGC 6057—The College Community and The Student (4) *Prereq or coreq: EGC 6005.*

EGC 6225—Personnel Testing (4) *Prereq: a course in basic statistics.*

EGC 6317—Vocational Development (4)

EGC 6405—Modern Counseling and Personnel Work (4) *Not open to majors in counselor education.*

EGC 6416—Counseling Theory (5) *Prereq: EGC 6005. Coreq: EGC 6447.*

EGC 6426—Counseling in Community Settings (4) *Prereq: EGC 6416, 6447, 7446. Coreq: current enrollment in a community agency practicum or internship.*

EGC 6438—Play Counseling and Play Process With Children (4) *Prereq: 6416, 6447, EDF 6113, or equivalent.*

EGC 6447—Laboratory in Counseling (1) *Coreq: EGC 6416.*

EGC 6461—Counseling With Drug Abuse Cases (4)

EGC 6463—Counseling Ethnic Minorities (4) *Prereq: EGC 6416, 6447.*

EGC 6465—Counseling for Mid-Life and Pre-Retirement (4)

EGC 6466—Counseling Needs of Older Persons (4)

EGC 6467—Counseling Older Persons: Theories and Techniques (4) *Prereq: EGC 6416, 6447.*

EGC 6505—Group Procedures in Guidance and Personnel (4) *Prereq: EGC 6416, 6447.*

EGC 6545—Group Counseling (4) *Prereq or coreq: EGC 6505, 7446.*

EGC 6606—Organization and Administration of Guidance and Personnel Programs (4) *Prereq: EGC 6416.*

EGC 6726—Sensitivity Exploration Laboratory (1) *Coreq: EGC 6005.*

EGC 6905—Individual Work (2-5; max: 15) *Prereq: consent of staff members and department chairperson; approval of proposed project.*

EGC 6910—Supervised Research (1-5)

EGC 6933—Seminar in Professional Development (2)

EGC 6938—Special Topics (2-5; max: 15) *Prereq: consent of department chairperson.*

EGC 6940—Supervised Teaching (1-5)

EGC 7056—Seminar in Higher Education Student Personnel (1-2; max: 6) *Prereq: EGC 6055, 6057.*

EGC 7318—Laboratory in Career Development (5)

EGC 7329—Seminar in Career Development (4)

EGC 7446—Practicum in Counseling (5; max: 25) *Prereq: EGC 6416, 6447, and written application to the practicum coordinator at least six weeks in advance of registration, S/U.*

EGC 7485—Seminar in Counseling Research (4) *Prereq: admission to candidacy for the doctorate in counselor education.*

EGC 7585—Practicum in Group Counseling (5; max: 15) *Prereq: EGC 6545, 10 credits in EGC 7446, and written application to the practicum coordinator at least six weeks in advance of registration.*

EGC 7616—Evaluative Research in Guidance, Counseling and Personnel Work (5) *Prereq: EGC 6225.*
EGC 7706—Consultation Procedures (4) *Admission limited to students in the Advanced School. Prereq: 10 credits of EGC 7446.*
EGC 7840—Practicum in Student Personnel Work (5; max: 15) *Prereq: 10 credits in EGC 7446 and written application to the practicum coordinator at least six weeks in advance of registration.*
EGC 7852—Practicum in Counseling Older Persons (5; max: 10) *Prereq: EGC 6416, 6447, 6467, and written application to the practicum coordinator at least six weeks in advance of registration.*
EGC 7890—Internship in Personnel Work (5; max: 25) *Prereq: completion of all practica required for the Ed.S., Ph.D., or Ed. D. degree and written application to the internship coordinator at least six weeks in advance of registration. S/U.*
EGC 7891—Practicum in Counseling Psychology (5; max: 15) *Prereq: EGC 6416, 6447, or equivalents; written application to the practicum coordinator at least six weeks in advance of registration; open only to students officially enrolled in the counseling psychology program.*
EGC 7892—Practicum in Psychological Assessment (5) *Prereq: EGC 6225, 10 credits in EGC 7446, written application to the practicum coordinator at least six weeks in advance of registration.*
EGC 7893—Internship in Counseling Psychology (5) *Prereq: 15 credits in EGC 7891, and written application to internship coordinator at least six weeks in advance of registration; open only to students officially enrolled in the counseling psychology program.*
EGC 7937—Seminar in Personnel Work (5) *Limited to students in the Advanced School who are near completion of course work for a degree.*
EGC 7980—Research for Doctoral Dissertation (1-15)

DIVISION OF CURRICULUM AND INSTRUCTION
College of Education

Director & Graduate Coordinator: A. J. Lewis

The Division of Curriculum and Instruction consists of three departments: General Teacher Education, Instructional Leadership and Support, and Subject Specialization Teacher Education. Through these departments the following degrees are granted: Master of Education (nonthesis), Master of Arts in Education (thesis), Specialist in Education, Doctor of Education, Doctor of Philosophy. Degrees are offered in the following specializations:

General Teacher Education: Early Childhood; Elementary, Middle School; Secondary.

Instructional Leadership and Support: Curriculum and Instruction Theory and Research; Educational Media and Instructional Design; Postsecondary; Reading; Supervision and Curriculum Development; Vocational, Technical, and Adult Education.

Subject Specialization Teacher Education: Art Education; Business Education; Foreign Language Education; Language Arts Education; Mathematics Education; Music Education; Science Education; Social Studies Education.

Advanced degrees (specialist and doctorate) are offered with specialization in music education and physical education with the cooperation of the respective departments.

Study for the Ed.S. and Ed.D. degrees in curriculum and instruction at the University of Florida and at Florida International University, University of Central Florida and University of North Florida, is possible through a cooperative arrangement in which appropriate members of the respective faculties are members of the graduate faculty of the University of Florida.

DAIRY SCIENCE
College of Agriculture

GRADUATE FACULTY 1979-80

Chairman: H. H. Van Horn, Jr. *Graduate Coordinator:* H. H. Head. *Professors:* C. B. Browning; B. Harris, Jr.; S. P. Marshall; W. W. Thatcher; H. H. Van Horn, Jr.; C. J. Wilcox; J. M. Wing. *Associate Professors:* K. C. Bachman; H. H. Head; J. J. Jezeski; K. L. Smith, D. W. Webb. *Assistant Professor:* R. J. Collier.

The Dairy Science Department offers the Master of Science and Master of Agriculture degrees (specialization in dairy production and dairy foods and products) and, in collaboration with the Departments of Animal Science, Microbiology and Cell Science, and Food Science and Human Nutrition, the Doctor of Philosophy degree (specialization in animal physiology, food science, genetics, and nutrition).

Areas of interest include quantitative genetics, ruminant nutrition, reproductive and lactational physiology, endocrinology, biochemistry, management, microbiology, milk chemistry, and the processing of milk and milk products.

A departmental prerequisite for admission to graduate study in dairy science is a strong undergraduate background in the physical or biological sciences. A prospective graduate student need not have majored in dairy science as an undergraduate.

The following courses in related areas will be acceptable for graduate credit as part of the candidate's major: ANS 6368—Quantitative Genetics; ANS 6448—Nitrogen and Energy in Animal Nutrition; ANS 6715—Ruminant Nutrition and Digestive Physiology; ANS 6723—Mineral Nutrition and Metabolism; ANS 6751—Physiology of Reproduction; STA 6168—Advanced Methods of Statistics.

DAS 6212C—Advanced Dairy Cattle Management (4) Modern scientific basis for management of Florida dairy cattle, including nutrition, physiology, and genetics. Group feeding, reproduction, and management under subtropical conditions.
DAS 6281—Dairy Science Research Techniques (4) *Prereq: STA 6168.* Methods employed in research in specialized dairy fields; genetics, nutrition, physiology, microbiology, chemistry or dairy technology.
DAS 6322—Introduction to Statistical Genetics (3) *Prereq: ANS 6368, STA 6168.* Development and application of statistical and quantitative genetic theory to estimation of genetic parameters and selection.
DAS 6512C—Advanced Physiology of Lactation (3) *Prereq: VES 6243C.* Anatomy and development of the mammary gland; endocrine regulation of mammary growth and milk secretion; the physiology and biochemistry of milk secretion; factors affecting milk yield and composition.
DAS 6531—Endocrinology (5) *Prereq: BCH 4203, 4313, VES 6243C.* The endocrine system including anatomy of the brain, neuroendocrine control, gland function, hormone structure and biosynthesis, and relationship to reproduction, lactation, growth, and metabolism.
DAS 6541—Energy Metabolism (4) Relationship of anatomy, physiology, and biochemistry to transformation of feed energy to free energy; energy utilization at levels of the cells, the organism, and the organism in relation to its environment.
DAS 6555—Environmental Physiology of Domestic Animals (4) *Prereq: VES 6242C, 6243C.* An examination of the interaction between environmental factors such as temperature, humidity, and photoperiod, and homeostatic mechanisms in domestic animals such as endocrine regulation, water bal-

ance, and feed intake. Effects on reproduction, lactation, and growth will be studied.
DAS 6617—Advanced Dairy Technology (2-5; max: 5) Theories and analytical techniques associated with chemical, physical, and microbiological changes of milk constituents during processing and storage of dairy products.
DAS 6651—Industrial Food Fermentations (4) *Prereq: FOS 4222.* Microbiological, chemical, and physical principles in fermentation of foods and constituents, including single cell production.
DAS 6905—Problems in Dairy Science (1-5; Max: 12) Research problems in dairy husbandry or dairy manufacturing.
DAS 6910—Supervised Research (1-5)
DAS 6931—Graduate Seminar in Dairy Science (1)
DAS 6940—Supervised Teaching (1-5)
DAS 6971—Research for Master's Thesis (1-15)

ECONOMICS
College of Business Administration

GRADUATE FACULTY 1979-80

Chairman: F. D. Arditti. *Graduate Coordinator:* A. R. Horowitz. *Graduate Research Professor:* G. S. Maddala. *Professors:* F. D. Arditti; R. D. Blair; R. H. Blodgett *(Emeritus);* J. R. Davis; C. H. Donovan *(Emeritus);* W. J. Frazer; E. L. Jackson *(Emeritus);* P. E. Koefod *(Emeritus);* M. R. Langham; R. F. Lanzillotti; M. M. Lockhart; J. W. Milliman; J. R. Vernon; W. Woodruff. *Associate Professors:* J. G. Ballentine; S. V. Berg; W. Bomberger; David A. Denslow; C. W. Fristoe *(Emeritus);* F. O. Goddard; A. R. Horowitz; N. G. Keig; W. G. Tyler. *Assistant Professors:* J. D. Adams; M. Barnea; H. H. Fishkind; L. L. Kreicher; S. G. Saunders; S. K. Smith.

The Department of Economics offers the Master of Arts (thesis or nonthesis option) and Doctor of Philosophy degrees, with specializations in business economics and forecasting, economic history, economic theory and quantitative analysis, human resource economics (including health care economics), industrial organization and social control, international economics and development, labor economics, Latin American area studies, monetary and fiscal economics, transportation and public utilities, and urban studies. The Master of Business Administration degree is also offered with a concentration in economics.

Specific areas of specialization include econometrics and mathematical economics, economic thought, economic development, economic history, labor and human resource economics, health care economics, industrial organization and social control, international trade, monetary economics, public finance, and urban-regional economics.

M.A./Ph.D. Core: ECO 5416, GEB 5805 or equivalent, ECO 5424, ECO 5425, ECO 6116, ECO 6117, ECO 6206, ECO 6207.

ACC 6811—Social and Economic Accounting (5) Social accounts and comparative economic accounting systems. Emphasis on national income accounting, the national balance sheet, sector accounts, and flow of funds analysis.
ECO 5111—Microeconomic Theory (5) *Designed for MBA candidates.* Determination of prices in a market economy; their role in allocating consumer and producer goods, in distributing incomes, and in effecting efficient combinations of resources in production.
ECO 5204—Macroeconomic Theory (5) *Designed for MBA candidates.* Macroeconomic theory with respect to determinants of national employment, aggregate income, economic fluctuations, inflation, and the price level.
ECO 5227—Central Banking and Monetary Policy (5) *Prereq: ECO 3213 or equivalent.* Critical study of the relationship between the Federal Reserve System, the money market, governmental finance, business fluctuations, and the internal and external value of money in the United States.
ECO 5416—Statistical Methods in Economics (5) *Prereq: STA 3024.* Introduction to fundamental statistical concepts: estimation, hypothesis testing, linear regression, and analysis of variance.
ECO 5424—Econometric Models and Methods I (5) *Prereq: ECO 5416.* Introduction to econometrics, including a survey of the classical econometric models as well as the scope and method of econometrics. Emphasis on techniques and their uses.
ECO 5425—Econometric Models and Methods II (5)
ECO 5545—Central Government Finance (5) *Prereq: ECO 2013-2023.* Economic effects of public expenditures; war finance; personal income and estate taxes; corporate income and profit taxes; excise taxes; debt problems.
ECO 5556—State and Local Finance (5) *Prereq: ECO 2013-2023.* Allocation of government functions and resources; property taxation, sales taxes, highway finance, business taxation; debt financing and control. Emphasis on Florida problems.
ECO 5566—Government Budgeting and Financial Administration (3) *Prereq: permission of department.* Budget process at various levels. Analysis of the operating behavior of governments in managing expenditure, debt, budgets, records, and reports.
ECO 5716—Foreign Exchange and International Financial Institutions (3) *Prereq: permission of department.* Study of the theoretical and practical aspects of foreign exchange.
ECO 6115—Neoclassical Economics (5) Analysis, criticism, and restatement of neoclassical theories concerning distribution of income. Rent, interest, wages, profits, personal distribution, supplementary distribution, and noncapitalistic distribution. The writings of Marshall, Hicks, Cassel, Boulding, Pigou, Fisher, Douglas, Knight, Stigler, and Schumpeter provide background for the discussion.
ECO 6116—Microeconomic Theory I (5) *Prereq: QMB 580S or equivalent.* Analysis, criticism, and restatement of neoclassical price and production theories. Demand, supply, cost of production, and price determination under various conditions of the market.
ECO 6117—Microeconomic Theory II (5) *Prereq: ECO 6116 and permission of the department.* Imperfect competition, general equilibrium, welfare, and optimization over time.
ECO 6206—Macroeconomic Theory I (5) Classical, Keynesian, and post-Keynesian aggregate income and employment analysis. Determination of price level and interest rate.
ECO 6207—Macroeconomic Theory II (5) *Prereq: ECO 6206 and permission of the department.* Dynamic macroeconomic models and the roles of expectations and portfolio choice.
ECO 6216—Monetary Economics I (5) Evolutionary and contemporary aspects of monetary theory. Qualities and characteristics of money, rate of interest, effectiveness of monetary policy, flow of funds between various sectors of the economy and financial markets; relationships between saving, investment, employment, price-level changes, and capital formation.
ECO 6236—Seminar in Monetary Economics (5) Current topics of research in the journals, studies by government agencies, and other published and unpublished materials.
ECO 6257—Stabilization Policy (5) Tools for promoting economic stabilization and growth. Opposing viewpoints as to proper scope and relation of monetary and fiscal controls.
ECO 6266—Monetary Economics II (5) Economic instabilities in capitalistic society. Emphasis on forces operating to bring about changes in the general level of prices, including prices of productive agents, employment, and income.
ECO 6305—The Development of Economic Thought I (5) Economic thought chronologically from Greek to contemporary times—including the chief schools in Great Britain, the Continent, and the United States. Marx and the socialists, nonorthodox thinkers, and critics of the classical school are treated equally with the main tradition.
ECO 6306—The Development of Economic Thought II (5) The two chief approaches in economic thought. Emphasis on philosophical outlook and methodology. Analytical ap-

proach and role of mathematics; calculus surveyed and related to the neoclassical theory. Relates the institutional approach of history and other social sciences; cultural theory of capitalist evolution.

ECO 6315—Present-Day Schools of Economic Thought (5) Contemporary American and English economic thinking with particular reference to developments occurring between the two World Wars. The writings of Hansen, Mitchell, Clark, and Commons in the United States, and of Keynes, Cole, Robinson, and Hobson in England.

ECO 6405—Mathematical Economics I (5) *Prereq: QMB 5805 or equivalent.* Mathematical approach to microeconomic theory, including theory of the firm, theory of consumer behavior, and selected topics in market conditions.

ECO 6406—Mathematical Economics II (5) *Prereq: ECO 6405.* Probability and simulation models of economic behavior; mathematical models from monetary economics.

ECO 6407—Nonstochastic Models (5) *Prereq: MAS 3113 or ESI 4567.* General linear programming model and its basic theorems, integer and nonlinear programming. Spatial equilibrium, input-output, and game theory models.

ECO 6426—Econometric Methods I (5) *Prereq: STA 4322 and MAS 3113 or ESI 4567.* Stochastic models. The general linear model and problems associated with its use in econometric research. Theory of the simultaneous equation approach, model construction, and estimation techniques.

ECO 6427—Econometric Methods II (5) *Prereq: ECO 6426 or AEB 6571.* Single equation topics, errors in variables, nonspherical disturbances, and lagged variables. Dynamic simultaneous equation models, and miscellaneous topics in multivariate analysis. Spectral and cross-spectral analysis.

ECO 6428—Research Seminar in Econometrics (1-5) *Prereq: ECO 6426.* Empirical measurement in applied economics. Empirical problem requiring the construction, estimation, and defense of a quantitative economic model.

ECO 6433—Macroeconomic Models and the Firm (5) *Designed primarily for MBA candidates. Prereq: ECO 5204, 5111, STA 6606, 6358.* Synthesis and application of macroeconomic theory and economic forecasting models to managerial decision making, with emphasis on understanding effects on the firm of economic actions taken by foreign and domestic governments.

ECO 6435—Problems in Statistics and Business Forecasting (5) Problems of linear operation regression analysis which may be used by managers as a basis for decision making. It will add to the student's knowledge of sophisticated statistical methods to aid in the analysis of current business problems.

ECO 6516—Public Revenue and Distribution (5) *Prereq: ECO 6116.* Classical and modern theories of taxation; tax incidence and allocative and distributive effects of income, excise, sales, death, and other forms of revenue including user charges, debt, and intergovernmental grants.

ECP 6526—Welfare Economics (5) A survey of welfare economics. Technical welfare formulation related to organic concepts of welfare and to political action in a democracy. Possibilities of normative economics evaluated.

ECO 6536—Public Expenditures and Collective Decisions (5) *Prereq: ECO 6202, 6116.* Theories of public expenditure, including public goods theory and associated systems of collective decision making. Criteria for the development of optimal fiscal systems and decision processes.

ECO 6617—The United States in the World Economy (1783-1970) (5) The interrelatedness of the United States' economy with other lands.

ECO 6626—The American Economy to 1860 (5) A functional approach. World economic conditions that led to the settlement of America; the colonial period; the period of economic transition; the westward movement and the rise of a national economy; economic causes of the Civil War.

ECO 6627—The American Economy Since 1860 (5) The closing of the economic frontier. The development of a capitalistic economy and the trend toward economic and financial imperialism. Economic problems of the wars of 1914-18 and 1939-45, and postwar economic adjustments, domestic and foreign.

ECO 6706—Theory of International Trade (5) Historical and economic background of foreign trade; theory of international trade; fundamentals of international exchange; international commercial policies and international trade; exchange fluctuations and their control; international monetary institutions.

ECO 6717—International Economic Relations (5) Capital formation in the underdeveloped countries, economic integration, balance of payments and international monetary reform, the economic consequences of population pressures and economic relations between the advanced and other nations.

ECO 6910—Supervised Research (1-5)

ECO 6940—Supervised Teaching (1-5)

ECO 6971—Research for Master's Thesis (1-15)

ECO 7118—Advanced Microeconomic Theory (5) *Prereq: ECO 6136.* Advanced topics in microeconomic theory. Axiomatic development of utility functions, stochastic and nonstochastic utility models. Static and dynamic production functions and investment criteria. General equilibrium and stability conditions.

ECO 7208—Advanced Macroeconomic Theory (5) *Prereq: ECO 6207.* Advanced topics in macroeconomic theory, including wealth effects and money illusion, the homogeneity postulate and exceptions to classical doctrine. The role of expectations and stability analysis.

ECO 7938—Advanced Economics Seminar (1-5; max: 10) *For advanced graduate students in economics. Prereq: student must have completed graduate core program and have preliminary dissertation topic.* Special topics.

ECO 7980—Research for Doctoral Dissertation (1-15)

ECP 5106—Economics of Human Resource Development (3) *Prereq: ECO 3100 or equivalent.* The capital concept applied to human resources. Effects of education, health, population policies, and discrimination on the stock of human capital. Role of human capital in economic development.

ECP 5205—Economics of the Labor Market (5) *Prereq: ECP 3203.* Intensive analysis of the economics of the labor market; theoretical and practical aspects of wage determination; impact of collective bargaining on wages, employment, and prices; economic effects of legislation dealing with the operating of the labor market.

ECP 5606—Special Problems in Urban and Regional Economics (5) *Prereq: ECP 5624, 5614.* Focuses on a specific urban and regional economic problem that is analyzed in depth. Topical coverage varies among such areas as: housing, land use, metropolitan financing, forecasting.

ECP 5614—Urban Economics (5) *Prereq: ECO 2013, 2023 and permission of department.* Economic analysis of urbanization and regional interdependence. Applicability of location theory and other economic analysis. Criteria for determining public expenditures and allocating costs in urban areas.

ECP 5624—Regional Economics (5) *Prereq: ECO 2013, 2023 or permission of instructor.* Regional economic phenomenon and the spatial distribution of economic activities. Analytical tools are developed and applied to urban and regional problems such as growth and decay, housing, land use, and transportation.

ECP 6207—Labor Economics (5) Wage determination and the role of wages in the economy; the effects of collective bargaining on wages, prices, and employment.

ECP 6216—Organized Labor in the United States (5) Problems connected with the relationship of organized labor with itself, management, government, and the public; labor policy and public welfare.

ECP 6225—Labor Markets, Manpower, and Public Policy (5) *Prereq: ECP 6216.* Labor markets and the role of unions as collective decision organizations; theories of collective choice. Unemployment as an economic and social problem. Analysis of various public and private labor-oriented programs, including social insurance, manpower training, poverty, and others.

ECP 6405—Industrial Organization and Social Control (5) Economic and other characteristics of modern industrial structures. Relationships between industrial structure, business conduct, and economic performance. Measurement of concentration and evaluation of performance. Public policies toward monopoly, conspiracy, and competition.

ECP 6407—Problems in Social Control (5) Nature and causes of market failure. Problems in developing and applying concepts of public interest in a market economy. Institutional

restraints to economic solutions; coordination of political and market decisions concerning the allocation of resources.

ECP 6426—Economics of Regulated Industries (5) Types and techniques of public control. Economic analysis and evaluation of regulatory and promotional policies. Administrative and legal aspects of the regulatory process. Special problems in particular industries.

ECP 6536—Health Care Economics I (5) *Prereq: ECO 6116.* Fundamental economic relations governing the production, consumption and financing of health care services. Characteristics of demand and production relationships; response of supply, "shortages," and possibilities for factor substitution; insurance and organizational alternatives.

ECP 6537—Health Care Economics II (5) *Prereq: ECO 6116.* Theoretical and empirical evaluations relating to the economic performance of the health care sector. Optimal price and output policy including distributional considerations; cost-benefit analysis, public production, research and centralized vs. decentralized control.

ECP 6615—Urban Economics (5) *Prereq: ECO 4205, 4101 or equivalent.* Salient aspects of urban phenomena including theoretical explanations of the process of urbanization; city structures and models. Urban problems including poverty and race, housing, transportation and environment. The urban public economy, and urban public services.

ECP 6625—Regional Economics (5) *Prereq: ECO 4205, 4101 or equivalent.* Definition of regions and elements of regional economic analysis. Location theory, regional interdependence and spatial equilibrium. Regional economic change, including economic accounts and other measures of activity; cycles, growth, and planned development.

ECP 6705—Economics of Business Decisions (5) *Designed primarily for MBA candidates. Prereq: ECO 5111, ACC 6311, STA 6606, 6357, 6358, MAR 5055, FIN 5405.* Synthesis and application of microeconomic theory and related business administration principles to managerial decision making through a problem-solving orientation.

ECP 6905—Individual Work in Economics (1-5; max: 10) Reading and/or research in the several areas of economics.

ECS 5005—Comparative Analysis of Economic Systems (4) *Prereq: permission of department.* Theoretical and empirical study of contemporary societal economic systems.

ECS 5115—Contemporary Economic Problems in Sub-Sahara Africa (3) Current developments in production, trade, and transportation, with emphasis on development plans in various countries.

ECS 5425—Financial Institutions and Fiscal Policies of Selected Latin American Countries (3) Public finances, money systems, and banking policies of representative countries of Latin America.

ECS 6006—Economic Systems Seminar (5) Market and nonmarket types of economies, their characteristics and economics, and their different significance for systems of government and general social orders, legal and juridical systems, and for business and public policy.

ECS 6015—Theory of Economic Development (5) Broad analytical, nonhistorical framework for examining economic underdevelopment and possible escape therefrom. Transition to secular economic growth and principles by which an underdeveloped country can achieve development objectives.

ECS 6025—Economic Development Seminar (5) Theory and problems of economic development pertinent to market and nonmarket economies. Emphasis on the relationship between economic system development and economic growth.

ECS 6405—The Economy of Spanish Latin America (5) Contemporary economic and commercial problems in Spanish Latin America; current developments in production, transportation, and trade of the various countries.

ECS 6415—The Economy of Brazil (5) Economic development and contemporary economic and commercial problems of Brazil; production, transportation, and trade from both a national and a regional point of view.

ECS 6426—Financial and Fiscal Institutions of Selected Sub-Saharan Countries (5) Public finances and the money and banking policies of representative countries of Africa.

EDUCATIONAL ADMINISTRATION & SUPERVISION
College of Education

GRADUATE FACULTY 1979-80

Chairman: J. L. Wattenbarger. *Graduate Coordinator:* J. Hale. *Professors:* S. K. Alexander, Jr.; T. W. Cole, Sr.; R. B. Kimbrough; R. B. Mautz; H. H. McAshan;* M. Y. Nunnery; C. A. Sandeen; E. A. Todd; J. L. Wattenbarger; E. F. White.* *Associate Professors:* P. A. Clark; J. A. Hale, T. C. Healy;* J. W. Longstreth; J. M. Nickens. *Assistant Professor:* H. Franklin.

**These members of the faculty of the University of North Florida are also members of the graduate faculty of the University of Florida and participate in the doctoral program of the University of Florida Department of Educational Administration and Supervision.*

Programs leading to the degrees Master of Arts in Education, Master of Education, Specialist in Education, Doctor of Education, and Doctor of Philosophy are offered through the Department of Educational Administration and Supervision.

Areas of specialization include general administration with emphasis on elementary and secondary administration and higher education administration with specialization in community college leadership, university leadership, vocational-technical administration, and administrative theory. Special programs in the administration of allied health programs in higher education and in school and college business management are also available.

The Institute of Higher Education provides advanced graduate students many opportunities for research and study in all areas of post high school education. Similarly, the Center for Community Education and the Institute for Educational Finance provide opportunities with special emphasis in those areas.

A candidate for admission to the department will be judged not only on the basis of quantitative criteria (listed elsewhere in this *Catalog*) but also in relation to prior experience, especially as it relates to future career goals.

Cooperative arrangements between the University of Florida, the University of North Florida, and Florida International University make it possible for qualified persons with master's degrees to obtain Ed.S. and Ed.D. degrees in educational administration and supervision from the University of Florida. Appropriate members of the faculties of UNF and FIU are or will be members of the graduate faculty of the University of Florida.

ADE 6260—Organization and Administration of Adult Education (4) Overview of adult education in the United States; the role of administration in adult education; the job of the local director of adult education; Florida law and regulations relating to adult education in the public schools.

EDA 6061—Educational Organization and Administration (4) Foundation course in school administration. Basic concepts, principles, and practices in local, state, and federal organization and administration.

EDA 6105—Operations Research in Education Administration (4) *Prereq: EDA 6271 and statistics course.* Application of select quantitative systems techniques from management and operations research to educational administration; utilities, queuing theory, graph theory, decision theory, game theory, simulation, and modeling.

EDA 6192—Educational Leadership I (4) Basic course on the nature of educational leadership. Emphasis on the role of official leadership in group development, improving group structure, and program improvements.

EDA 6195—Educational Leadership II (4) Contemporary research on diffusion of innovations, planning of change, organizational theory, and political power in policy decision

making. Role of administrators and instructional leaders in establishing educational policies.

EDA 6201—Business Affairs in Education (4) Role and function of the business office and a review of current research and administrative procedures related to purchasing and supply management, school food service, transportation, insurance, indebtedness, and office management.

EDA 6203—Educational Budgeting and Accounting Systems (4) Contemporary theory and research in fiscal budgeting and accounting processes in colleges and universities, elementary and secondary schools, with simulated practical application through case studies and problems dealing with annual budgets and cost effectiveness.

EDA 6222—Administration of School Personnel (4) Problems of the professional school staff and administration of staff personnel in public schools.

EDA 6225—Labor Relations in Public Education (4) Introduction to problems and issues. Emphasis on various aspects of employee, union, and management relationships in the public sector, including elementary, secondary, and higher education.

EDA 6232—Public School Law (4) Legal status of schools in the United States; emphasis on Florida conditions, school laws, constitutional provisions, judicial decisions, Attorney General's rulings, and regulations of the State Board of Education.

EDA 6242—Public School Finance (4) State, local, and federal financing of education; the foundation program of school financing; principles and criteria of taxation for education; education and the national economy.

EDA 6271—Utilization of Computers in Educational Administration (4) Man-machine systems in educational administration. Electronic data processing and the school administrator, educational information systems, and other computer applications.

EDA 6300—Principles of Community Education Administration (4) The developing concepts and application of the basic principles to administration of educational institutions and community agencies.

EDA 6306—Theories and Practices of Community Education Administration (4) *Prereq: EDA 6300.* Contemporary theories and practices, with emphasis on interagency coordination and cooperation, programming for lifelong learning and community member involvement in educational decision making.

EDA 6503—The Principalship (4) Organization and administration of the school; emphasis on competencies necessary for leadership and management of the school center, both elementary and secondary.

EDA 6910—Supervised Research (1-5)

EDA 6931—Special Topics (1-5; max: 15)

EDA 6935—Problems in School Administration and Supervision (1-5; max: 15) In-service training course through regularly scheduled on-campus work conferences open only to superintendents and supervisors; or a problems course, offered through extension or on campus, for superintendents, supervisors, principals, junior college administrators, and trainees for such positions. S/U.

EDA 6940—Supervised Teaching (1-5)

EDA 6948—Supervised Practice in School Administration (4; max: 8) *Only advanced graduate students are permitted to enroll.* Students are given an opportunity to perform administrative duties under supervision. S/U.

EDA 6971—Research for Master's Thesis (1-15)

EDA 7103—Seminar: Theories of Educational Administration (4) *Prereq: year of graduate study.* Basic theories of the organization and administration of public education; historical origins of theories; assumptions underlying current concepts of administration and theory development.

EDA 7205—Educational Planning (4) Cooperative planning of educational programs. Skills and methodologies associated with developing annual and long-range comprehensive plans for meeting educational needs of school districts, colleges, and universities.

EDA 7236—The Law and Higher Education (4) Legal framework of colleges and universities; relationship between private and public institutions; federal and state statutory and constitutional provisions bearing on higher education; legal implications involved in administrative relationships with faculty and students.

EDA 7244—The Financing of Higher Education (4) Financing of higher education, junior college through university. Economics of higher education, application of the planning, programming, budgeting system to higher education. Evaluation of various models of financing education from federal, state, and private sources, and student fees.

EDA 7260—Planning Educational Facilities (4) School plant survey methods and planning of educational facilities. Field experience available.

EDA 7550—Higher Education Administration (4) Educational policies, functions, and practices.

EDA 7565—Coordination of State Systems of Higher Education (4) Organizational structure and the basic principles of coordination and control of higher education at state and regional levels. Principles of leadership expressed through controlling and coordinating boards; role of boards and staff in planning development and operation; state, regional, and national accrediting agencies.

EDA 7945—Practicum in Supervision and Administration (1-10; max: 15) A seminar and an internship in administration and supervision. S/U.

EDA 7980—Research for Doctoral Dissertation (1-15)

EDA 7990—Research Design in Educational Administration (3) *Open only to students in the Advanced School. Prereq: EDG 7486* Individually identified problems in administration conceptualized in theoretical terms and appropriate research procedures determined.

EEX 6511—Administration in Special Education (4) *Prereq: EEX 3010 or 6051.* Local, state, and federal organization and administration, with emphasis on the administration of services to handicapped children.

EEX 7535—Seminar in Administration and Supervision of Special Education (4; max: 12) *Prereq: EDA 6061, EEX 6511.* Current problems in the provision of special education services in local, state, and federal programs.

EEX 7945—Practicum: Special Education Administration (4-12; max: 12) *Prereq: EEX 7535, eight credits of special education, eight credits of educational administration, and written request to enroll six weeks prior to registration.*

ELECTRICAL ENGINEERING
College of Engineering

GRADUATE FACULTY 1979-80

Chairman: B. E. Cherrington. *Graduate Coordinator:* M. A. Uman. *Graduate Research Professors:* R. E. Kalman; J. T. Tou; A. Van Der Ziel. *Professors:* T. E. Bullock; W. H. Chen; E. R. Chenette; B. E. Cherrington; D. C. Childers; O. I. Elgerd; R. C. Johnson, Jr.; S. S. Li; F. A. Lindholm; A. H. Nevis; J. R. O'Malley; R. A. Ramey, Jr.; C. V. Shaffer; J. R. Smith, S. Y. W. Su; R. L. Sullivan; A. D. Sutherland; M. A. Uman; M. Zahn. *Associate Professors:* R. L. Bailey; L. W. Couch, II; K. L. Doty; J. G. Fossum; M. H. Latour; A. Neugroschel; A. Paige; J. K. Watson. *Assistant Professors:* D. R. MacQuigg; M. E. Warren. *Eglin AFB Extension Service:* K. E. Dominiak; R. Yii.

The Department of Electrical Engineering offers the Master of Engineering, Master of Science, Engineer, and Doctor of Philosophy degrees. The department offers graduate study and research in biomedical engineering, computer and information engineering, communication science, system science, physical and applied electronics, atmospheric electricity, electric energy sciences, and other engineering disciplines.

Graduate students in the Department of Electrical Engineering have bachelor's degrees from many areas —electrical engineering, other engineering disciplines, mathematics, physics, chemistry, and other technical fields.

A thesis is usually required for all master's degree

candidates. The minimum course work required for the master's degree is 49 credits, including no less than 40 credits of regular course work and up to nine credits of the research course numbered EEL 6971.

Study for the Ph.D. degree in electrical engineering at the University of Florida by qualified master's degree recipients at the University of Central Florida is facilitated by a cooperative arrangement in which appropriate members of the faculty of UCF are members of the graduate faculty of the University of Florida.

The Ph.D. entrance exam will be given only once each year during the winter quarter and will consist of both a written and oral examination which all prospective Ph.D. students must take at the earliest opportunity.

The following course listing indicates the major areas of faculty interest. Special topics courses, EEL 5934, EEL 5905, EEL 6935, and EEL 6905, cover a variety of subjects for which there are no present courses.

EEL 5134—Analysis of Nonlinear Systems (3) *Prereq: EEL 5182.* Analysis of nonlinear systems by Liapunov theory, perturbation, and describing functions.

EEL 5161—Computational Techniques for Circuit Analysis (4) *Prereq: EEL 3135 or consent of instructor.* Numerical techniques as applied to simulation of circuit behavior.

EEL 5182—State Variable Methods in Linear Systems (4) *Prereq: EEL 3135.* Linear algebra and state variable methods for design and analysis of discrete and continuous linear systems.

EEL 5370C—Applied Electronics (4) Modern communication circuits. Laboratory.

EEL 5485—Applied Magnetics (4) Properties and processes in magnetic materials are introduced through examples such as inductors, pulse transformers, memory elements, dc to dc converter, and tape recording.

EEL 5544—Noise in Linear Systems (5) Passage of electrical noise and signals through linear systems. Statistical representatin of random signals, electrical noise, and spectra.

EEL 5562—Pictorial Information Processing Principles (3) Pictorial data representation image encoding; image enhancement; image restoration; image segmentation; symbol manipulation; pictorial data storage; retrieval and display; interactive graphics; pattern classification.

EEL 5718—Computer Communications (3) *Prereq: EEL 4514.* Design of data communication networks; modems, terminals, error control, multiplexing, message switching, and data concentration.

EEL 5719C—Digital Filtering (5) Analysis and design of digital filters for discrete signal processing; spectral analysis; fast Fourier transform.

EEL 5761—Hardware-Software Interactions: Time Sharing System (4) *Prereq: EEL 4714C.* Input-output control and interface, resource sharing and allocation. Software (hardware) extensions of hardware (software) functions. Digital system evaluation.

EEL 5762—Modular Design of Digital Processors (3) *Prereq: EEL 4712C.* Application of a modular design language to designing digital systems. Hardware constraints. Behavior and use of medium and large-scale integrated circuits.

EEL 5768—Principles of Computer Interfacing (3) *Prereq: EEL 4713C.* Functional, logical, and timing requirements in the control of peripheral equipment. Peripheral-processor communication and protocol.

EEL 5769—Hardware-Software Interactions: Nonnumeric Processing (3) *Prereq: EEL 5821 or consent of instructor.* Information representations; content and context search methods; associative memories; retrieval language mapping; parallel processing; hardware and software garbage collections.

EEL 5821—Principles of Information Science (3) *Prereq: EEL 4714C.* Languages and models for structures of information, search and matching techniques, equipment technology, retrieval systems, structure and file evaluation.

EEL 5905—Individual Work (1-6; max: 12) *Prereq: consent of department chairman.* Selected problems or projects.

EEL 5934—Special Topics in Electrical Engineering II (1-4; max: 12)

EEL 6156—Advanced Circuit Analysis (3) Advanced techniques of circuit analysis.

EEL 6157—Generalized Network Theory (3) *Prereq: EEL 6156.* Networks which are not necessarily linear, lumped, passive and reciprocal. The gyrator. Extensions of classical methods to more general networks.

EEL 6162—Computer-Aided Circuit Design (4) *Prereq: EEL 5161.* Design objectives, performance functions, optimization techniques as applied to circuit design; other state-of-the-art topics.

EEL 6170—Elements of Linear Systems (3) *Prereq: MAA 5402 or consent of instructor.* Properties of systems. Convolution and transform theory for continuous and discrete-time signals in linear systems.

EEL 6171—Advanced System Theory I (4) Matrix theory required for the study of complex linearized dynamic systems and electric networks; stability theory; illustrative examples.

EEL 6172—Advanced System Theory II (3) *Prereq: EEL 6171.* Further application of matrix methods to dynamic systems and electric networks; extension to discrete, nonlinear, and nonstationary systems. Markov process.

EEL 6264—Advanced Electric Energy Systems I (3) *Prereq: EEL 4215 or consent of instructor.* Energy systems in steady state; advanced analysis methods.

EEL 6265—Advanced Electric Energy Systems II (3) *Prereq: EEL 6264.* Optimum control strategies for energy systems under normal operating conditions.

EEL 6266—Advanced Electric Energy Systems III (3) *Prereq: EEL 6265.* Energy systems under faulted conditions; security considerations.

EEL 6267—Advanced Electromechanical Energy Conversion (3) Electromechanical energy conversion processes from a field theory point of view. Dynamics of media in the presence of electric and magnetic fields.

EEL 6311—Electronic Circuits I (3) *Prereq: required undergraduate electronics and control sequence.* Analysis and design of operational amplifier circuits.

EEL 6312—Electronic Circuits II (3) *Prereq: EEL 6311.* Design of active circuits.

EEL 6313—Electronic Circuits III (3) *Prereq: EEL 6312.* Analysis and design of phase-locked loops and frequency synthesizers.

EEL 6315—Solid State Circuits I (4) F. *Prereq: EEL 3396, 4331C.* Advanced IC design. Design rules, use of computer in circuit simulation and mask layout. Each student designs a small CMOS system or circuit to be included on the class chip.

EEL 6316—Solid State Circiuts II (3) W. *Prereq: EEL 6315.* Continuation of EEL 6315.

EEL 6317—Solid State Circuits III (3) S. *Prereq: EEL 6316.* Continuation of EEL 6315 series.

EEL 6381—Network Representation of Solid-State Devices I (3) *Prereq: EEL 3396 or consent of instructor.* Relationship between equivalent-circuit models and the physical mechanisms governing device operation. Special attention given to approximations and methods of reasoning. Emphasis on large-signal, dynamic models for MOS transistors and related devices.

EEL 6382—Semiconductor Physical Electronics I (3) Crystal structures; imperfections; statistics; lattice dynamics; energy band theory. Equilibrium properties of electrons and holes in semiconductors.

EEL 6383—Semiconductor Physical Electronics II (3) *Prereq: EEL 6382.* Electronic transport phenomena. Boltzmann's equation and transport coefficients in semiconductors. Scattering mechanisms. Recombination-generation and trapping processes; optical properties.

EEL 6384—Semiconductor Physical Electronics III (3) *Prereq: EEL 6383.* Excess carrier phenomena. Photoelectric effects in semiconductors. Optoelectronic devices. Metal-semiconductor devices. Junction and MOS devices.

EEL 6388—Fluctuation Phenomena I (3) *Prereq: EEL 5544.* Theory with applications to electrical engineering. Sources of noise in devices; influence upon performance of circuits and systems; limitation of detectors and sensitive measuring instruments.

EEL 6397C—Semiconductor Junction Devices I (3) *Prereq:*

EEL 4352 or consent of instructor. Semiconductor material properties; equilibrium and nonequilibrium processes; quasi-Fermi levels; pn-junctions.

EEL 6398—Semiconductor Junction Devies II (3) *Prereq: EEL 6397C.* Basic mechanisms in pn-junction diodes; charge-control modeling; high-level injection; L-H junctions; basic mechanisms in bipolar transistors.

EEL 6399—Network Representation of Solid-State Devices II (3) Same as EEL 6381 except emphasis on bipolar transistors and related devices. EEL 6381 not a prerequisite.

EEL 6442—Physical Optics for Engineers (3) Fourier analysis approach to physical optics; spread and transfer functions, effects of optical spectrum limitations. Noise. Holography. Aberrations, lens system design and optimization.

EEL 6443—Electro-Optical Devices (3) Laser oscillators and amplifiers: gaseous, liquid, solid, and semiconductor lasers. Crystal optics: nonlinear optics, second harmonic generation, parametric amplifiers and oscillators. Electro-optical modulators, detectors, optical transmission lines and antennas. Integrated optics.

EEL 6444—Electro-Optical Systems (3) *Prereq: EEL 6442, 6443.* Laser oscillator noise, background radiation, atmospheric propagation, detection noise. Baseband pulse and digital laser communication systems. Subcarrier and heterodyne digital communication systems. Optimization. Intracity optical links. Space communications. Optical control systems. Optical computer information storage. Synthetic aperture radar. Remote sensing.

EEL 6450—Wave Propagation in Anisotropic Media (3) *Prereq: EEL 6487.* Electrical properties of solids, liquids, and gases. Propagation of fields in anisotropic media.

EEL 6486—Electromagnetic Field Theory and Applications I (3) *Prereq: undergraduate course in fields and waves.* Advanced electrostatics, magnetostatics, and time-varying electromagnetic fields.

EEL 6487—Electromagnetic Field Theory and Applications II (3) *Prereq: EEL 6486.* Wave propagation, waveguides, radiation, antennas.

EEL 6503—Signal Representation and Design (5) *Prereq: EEL 4516 or equivalent.* Representation of signals and noise by sampling. Fourier and other transform methods, complex variable techniques. Criteria of optimality in communication and ranging systems. Analytical signal theory; digital signal design.

EEL 6505—Digital Signal Processing (5) *Prereq: EEL 5544, EEL 5719C.* Measurement and analysis of signals and noise. Digital filtering and special analysis; fast Fourier transform.

EEL 6509—Space Communications (5) *Prereq: EEL 6534.* Telemetering systems, space communication links, satellite communications systems, space tracking, and navigation systems.

EEL 6524—Statistical Decision Theory (5) *Prereq: EEL 5544.* Hypothesis testing of signals in the presence of noise by Bayes, Neyman-Pearson, minimax criteria; estimation of signal parameters.

EEL 6534—Theory of Communication I (5) *Prereq: EEL 5544.* Filtering, modulation, and demodulation of signals corrupted by noise; passage of electrical noise and signals through nonlinear filters and systems.

EEL 6535—Theory of Communication II (5) *Prereq: EEL 5544.* Optimum receiver principles; analysis of digital and analog communication systems in the presence of noise; modeling of communication channels.

EEL 6614—Modern Control Theory I (3) *Prereq: EEL 5182, 6171.* Optimization of systems using calculus of variations, dynamic programming, and the maximum principles. Extensive study of the linear plant quadratic loss case.

EEL 6615—Modern Control Theory II (3) *Prereq: consent of instructor.* Optimization in the presence of noise. State observers, dynamic compensators, and Kalman-Bucy filters.

EEL 6616—Modern Control Theory III (3) *Prereq: EEL 6615.* Advanced and specialized topics of current interest in modern systems theory, with emphasis on computational methods.

EEL 6622—Nonlinear Control Systems (3) *Prereq: EEL 5182.* Stability of nonlinear systems using Liapunov's second method, the Popov and other frequency domain criteria.

EEL 6733—Analysis and Synthesis of Switching Circuits (5) *Prereq: EEL 6534, 6824.* Boolean algebra; switching circuits; topics in analysis and design of combinational and sequential digital circuits. Applications to cellular systems design.

EEL 6741C—Microprocessors: Architectures and Applications, Laboratory (4) *Prereq: EEL 4713, 4714.*

EEL 6767—Computing Machine Theory (5) *Prereq: EEL 4713C, EEL 6824.* Evaluation, study and comparison of computer systems. Development of formal and informal models of computer architectures. Topics of current interest in computer organization.

EEL 6824—Foundations of Information Science (5) *Prereq: EEL 4712C.* Problems in information science; regular expressions; push-down automata; context-free languages; theory of algorithms; symbol manipulation; stochastic automata; associative memories; information storage and retrieval.

EEL 6825—Pattern Recogniton Theory and Applications I (3) Decision functions; optimum decision criteria; training algorithms; cluster seeking; unsupervised learning; piecewise linear machine; potential functions; applications.

EEL 6826—Pattern Recognition Theory and Applications II (3) *Prereq: EEL 6824.* Syntactic pattern recognition; classification algorithms; feature extraction; data reduction; computer-aided diagnosis; intelligent robots; database design for intelligent systems.

EEL 6827—Topics in Information Storage and Retrieval (3) *Prereq: EEL 5821.* Data manipulation and description languages, information network, systems evaluation, question-answering and man-machine communication.

EEL 6843—Applications of Automata Theory (5) *Prereq: EEL 4712C, EEL 6733.* Introduction to regular expressions, push-down automata, context-free languages, formal grammars, Turing machines and their applications to computer organization and compiler design.

EEL 6905—Individual Work (1-6; max: 12) *Prereq: consent of department chairman. Selected problems or projects.*

EEL 6910—Supervised Research (1-5)

EEL 6932—Graduate Seminar (1; max: 4) Discussion of topics in fields of graduate study and research. S/U.

EEL 6935—Special Topics in Electrical Engineering (1-6; max: 18, including EEL 6905)

EEL 6940—Supervised Teaching (1-5)

EEL 6971—Research for Master's Thesis (1-15)

EEL 7980—Research for Doctoral Dissertation (1-15)

ELR 5112—Automatic Speech Processing (3) *Prereq: EEL 3135.* Various models of speech production and perception. Operation of mechanical speech synthesizers and a discussion of automatic speech recognition. Introduction to various measuring devices commonly used in speech laboratories.

ELR 5210—Cybernetics (5) Topics in communication, control, information processing, and intelligence in man and machines, man-machine, and machine-machine interactions.

ELR 6225—Electrical Activity of the Nervous System (3) *Prereq: MAP 3302; EEL 3135 or PHY 4712 L. Coreq: EML 3100 or PHY 4523.* Analysis of the electrical signals of peripheral nerve and brain, with application of systems engineering techniques.

ELR 6226—Biophysical Models of Nerve Impulse Propagation (3) *Prereq: ELR 6225.* Analysis of chemical, electrical, hydrodynamic, and solid-state models of axonic and synaptic nerve transmission.

ENGINEERING—GENERAL
College of Engineering

The following courses deal with topics of concern to two or more areas of specialty offered in the College of Engineering.

EEL 6447—Gas Lasers and Their Engineering Applications (4) *Prereq: PHY 3123, ENU 4704.* Introduction to theory of gas lasers. Laser design; extensive coverage of applications of gas lasers.

ENU 6730—Introduction to Plasmas (3) *Prereq: PHY 3223, MAP 5345.* Nomenclature, materials, and plasma devices, fundamentals of plasma kinetic theory, low and high pressure discharges, technical applications.

ENU 6731—Plasma Theory (4) *Prereq: EEL 6451.* Microscopic

and macroscopic foundations of plasma theory. Individual motion of charged particles and macroscopic plasma motion in an electromagnetic field. Nonequilibrium states and relaxation processes. Waves and instabilities.

ENU 6741L—Plasma Laboratory (4) Laboratory practice in use of equipment and determination of basic parameters of plasmas.

EGM 5816—Intermediate Fluid Dynamics (3) *Prereq: MAP 3302 and consent of instructor.* Vector calculus applied to the basic equations of fluid dynamics and transport phenomena.

EGM 6250—Theoretical Acoustics (3) *Prereq: basic course in vibrations and some background with partial differential equations.* Fundamentals of wave phenomena in vibrating solid and fluid media. Analytical methods of attacking acoustical problems.

EGM 6321—Principles of Engineering Analysis I (3) *Prereq: MAP 5304.* Solution of ordinary differential equations with variable coefficients. Method of Frobenius, classification of singularities, integral representations of solutions. Treatment of classical equations of Bessel, Legendre, Hermite, and Mathieu. Asymptotic solutions using the WBK method and saddle-point technique.

EGM 6322—Principles of Engineering Analysis II (3) *Prereq: MAP 5304.* General methods for solving partial differential equations of first and second order. Classification into hyperbolic, elliptic, and parabolic types. Reduction to canonical form. Equations of wave propagation, heat conduction, and Laplace. Treatment of initial and boundary value problems.

EGM 6323—Principles of Engineering Analysis III (3) *Prereq: EGM 6322.* Dirichlet and Neumann boundary value problems. Green's function for Laplace's equation, conformal mapping spherical harmonics. Solution of the Helmholtz, Poisson, and biharmonic equations. Application to inviscid hydrodynamics, optical diffraction and gravitational potential theory.

EGM 6324—Principles of Engineering Analysis IV (3) *Prereq: MAP 5304.* Solution of Volterra and Fredholm integral equations of the first and second kind. Inversion of self-adjoint operators via Green's function, properties of symmetric kernels, Hilbert-Schmidt theory and the bilinear formula. Treatment of the singular integral equations of Abel and Carleman. Iteration and approximation techniques.

EGM 6325—Principles of Engineering Analysis V (3) *Prereq: EGM 6321.* Solution techniques for nonlinear differential and integral equations. Equations of Riccati, van der Pol, and Hammerstein. Elliptic functions and Painlevé transcendents. Phase plane, singular points, limit cycles and stability of autonomous systems. Similarity transforms and singular perturbation theory applied to nonlinear partial differential equations arising in hydrodynamics.

EGM 6811—Theory of Fluid Flow I (4) *Prereq: EGM 5816.* Concepts of velocity potential, differential equations of motions, continuity, and state. Practical solutions of two- and three-dimensional flow.

EGM 6812—Theory of Fluid Flow II (3) *Prereq: EGM 6811.* Concepts of velocity potential, stream function, and irrotational flow. Application of conformal transformations to two-dimensional flow.

EGM 6813—Theory of Fluid Flow III (4) *Prereq: EGM 6811.* Differential equations of constant density viscous fluid flow and their exact and approximate solutions. Laminar and turbulent boundary layers. Magnetohydrodynamic effects.

EGM 6835—Boundary Layer Theory (4) *Prereq: EGM 6813* Variable density laminar and turbulent boundary layers. Transformations to constant density flow. Integral methods. Mass transfer, diffusion, chemical reactions, extraneous effects.

EGM 6845—Theories of Turbulent Flows (4) *Prereq: EGM 6811, EEL 5544.* Mathematical theory of the turbulent motion of fluids. History and introduction to contemporary research in the statistical theory of turbulence.

EGN 6740—Surface Hydrology (4) *Prereq: MAP 3302, EGN 3353.* Mechanics of the occurrence and distribution of water by natural processes including the global energy balance, geophysical fluid motions, precipitation, run-off, infiltration, and water losses. Catchment characteristics and hydrograph analysis.

EGN 6741—Operational Hydrology I (4) *Prereq: EGN 6740.* Frequency analysis of hydrologic events. Hydrologic probability distributions. Analysis and synthesis of hydrologic data. Linear and nonlinear regression. Multivariate analysis of hydrologic signals.

EGN 6742—Operational Hydrology II (4) *Prereq: EGN 6741.* Correlation and spectral analysis of hydrologic signals and systems. Application of linear systems theory to components of hydrologic cycle and total rainfall-runoff process. Criteria for hydrologic instruments and networks.

ENGINEERING SCIENCES
College of Engineering

GRADUATE FACULTY 1979-80

Chairman: K. T. Millsaps. *Graduate Coordinator:* C. C. Hsu. *Graduate Research Professors:* N. Cristescu; A. E. S. Green; R. E. Kalman. *Professors:* R. C. Anderson: R. L. Bisplinghoff; W. H. Boykin, Jr.; M. H. Clarkson; I. K. Ebcioglu; M. A. Eisenberg; C. S. Hartley; G. W. Hemp; J. W. Hoover; U. H. Kurzweg; B. M. Leadon; E. R. Lindgren; L. E. Malvern; K. T. Millsaps; G. E. Nevill, Jr.; E. Partheniades; C. A. Ross; R. L. Sierakowski; E. K. Walsh; H. E. Wilhelm. *Engineer:* J. E. Milton. *Associate Professors:* C. G. Edson; R. L. Fearn; C. C. Hsu; S. Y. Lu.

The Department of Engineering Sciences offers the Master of Engineering, Master of Science, and Engineer degrees in aerospace engineering, in engineering mechanics, and in engineering science. The Doctor of Philosophy degree is offered in aerospace engineering and in engineering mechanics, with specialized tracks in the latter discipline in coastal and oceanographic engineering, in engineering analysis and applied mathematics, and theoretical and applied mechanics.

Areas of specialization include aerodynamics, applied mathematics, applied optics, atmospheric science, biomechanics, coastal hydraulics and water quality control, coastal hydrodynamics and oceanography, control theory, creative design, fluid mechanics, solid mechanics, and structural mechanics.

Aerospace Engineering

The following *Engineering Common Courses* are available for graduate major credit: ENU 6730—Introduction to Plasmas; ENU 6731—Plasma Theory; ENU 6741L—Plasma Laboratory; EGM 5816—Intermediate Fluid Dynamics; EGM 6321—Principles of Engineering Analysis I; EGM 6322—Principles of Engineering Analysis II; EGM 6323—Principles of Engineering Analysis III; EGM 6324—Principles of Engineering Analysis IV; EGM 6325—Principles of Engineering Analysis V; EGM 6811—Theory of Fluid Flow I; EGM 6812—Theory of Fluid Flow II; EGM 6813—Theory of Fluid Flow III; EGM 6835—Boundary Layer Theory; EGM 6845—Theories of Turbulent Flows.

EAS 6135—The Dynamics of Real Gases I (3) Introductory kinetic theory of gases including dynamics of binary collisions, conservation laws, velocity distribution functions, Boltzmann equation, equation of change, chemical equilibrium, and law of mass action. Rarefied and slip flow.

EAS 6136—The Dynamics of Real Gases II (3) *Prereq: undergraduate thermodynamics and fluid mechanics.* Chemical thermodynamics and statistical thermodynamics of real gas mixtures in flowing systems. Ionization, relaxation, and nonequilibrium.

EAS 6137—The Dynamics of Real Gases III (3) Radiative energy transfer in gases. Radiation gas dynamics including effects of line shapes, scattering, optically thick and thin systems, and gray approximations.

EAS 6141—Advanced Plasma Topics (3) Selected topics with application to aeronautics and astronautics.

EAS 6142—Probe Techniques for Plasma Diagnostics (3) *Prereq: EEL 6451.* Basic theory of electric and magnetic probes

for plasma diagnostics; practical application to laboratory plasmas.

EAS 6221—Advanced Aerospace Structures I (3) Steady state aeroelastic and structural problems. Flutter analysis. Transient loads, nonstationary and oscillating airfoil theory.

EAS 6222—Advanced Aerospace Structures II (3)

EAS 6223—Advanced Aerospace Structures III (3)

EAS 6241—Aerospace Structural Composites II (3) *Prereq: EGM 6652, EAS 4240.* Analysis of fibrous reinforced structural composites for aerospace applications.

EAS 6503—Astronautical Mechanics I (3) *Prereq: EGM 6444.* Small oscillations. Perturbation theory; methods of celestial mechanics. Numerical methods of orbit computation.

EAS 6504—Astronautical Mechanics II (3) *Prereq: EAS 6503.* Lunar theory; orbits about an oblate spheroid; tumbling of an orbiting vehicle. Atmospheric entry problem.

EAS 6514—Near-Earth Space Operations (3) Technical problems associated with the manned orbiting laboratory.

EAS 6720—Advanced Aerospace Design (1-9; max: 15) Advanced aerospace design projects.

EAS 6804L—Advanced Space Instrumentation Laboratory (1-9; max: 9) Laboratory experiments relating to instrumentation of space vehicles. Scientific principles of instruments used or to be modified for space missions.

EAS 6905—Aerospace Research (1-9; max: 15)

EAS 6910—Supervised Research (1-5)

EAS 6935—Graduate Seminar (1; max: 12) Discussion of topics in fields of graduate study and research. S/U.

EAS 6939—Special Topics in Aerospace Engineering (1-9; max: 15) Laboratory, lectures, or conferences covering selected topics in aerospace engineering.

EAS 6940—Supervised Teaching (1-5)

EAS 6971—Research for Master's Thesis (1-15)

EAS 7980—Research for Doctoral Dissertation (1-15)

Engineering Science and Mechanics

The following *Engineering* Common Courses are available for graduate major credit: ENU 6730—Introduction to Plasmas; ENU 6731—Plasma Theory; ENU 6741L—Plasma Laboratory; EGM 5816—Intermediate Fluid Dynamics; EGM 6321—Principles of Engineering Analysis I; EGM 6322—Principles of Engineering Analysis II; EGM 6323—Principles of Engineering Analysis III; EGM 6324—Principles of Engineering Analysis IV; EGM 6325—Principles of Engineering Analysis V; EGM 6811—Theory of Fluid Flow I; EGM 6812—Theory of Fluid Flow II; EGM 6813—Theory of Fluid Flow III; EGM 6835—Boundary Layer Theory; EGM 6845—Theories of Turbulent Flows.

EGM 5005—Laser Principles and Applications (4) *Prereq: consent of instructor.* Operating principles of solid, electric discharge, gas dynamic and chemical lasers. Application of lasers to lidar, aerodynamic and structural testing and for cutting and welding of materials.

EGM 5111L—Experimental Stress Analysis I (3) *Prereq: EGM 3520.* Introduction to techniques of experimental stress analysis in static systems. Lecture and laboratory include applications of electrical resistance strain gauges, photoelasticity, brittle coatings, moiré fringe analysis and x-ray stress analysis.

EGM 5421—Modern Techniques of Structural Dynamics I (3) *Prereq: EGM 3400, 3520, 3311 and EIN 3114.* Modern methods of elastomechanics applied to systematic analysis and automatic computation. Finite difference techniques, matrix force and displacement methods, finite element modeling. Application of digital computers.

EGM 5430—Intermediate Dynamics (3) *Prereq: EGM 3400, 3311.* Motion of particles and rigid bodies under constant and variable force fields. Introduction to Hamilton and Lagrange equations.

EGM 5533—Advanced Mechanics of Solids and Structures (3) *Prereq: EGM 3520.* Analysis of stress and strain in deformable bodies. Elastic stress-strain relations. Theories of failure. Shear center. Unsymmetrical bending of beams. Curved beams. Beams on elastic foundations. Torsion of bars. Energy methods.

EGM 5550—Elevated Temperature Stress Analysis (3) *Prereq: EML 4140, EGM 3520.* Sources of heat and heat transfer. Transient temperatures and stresses in tubes, rings, shafts, beams, and built up structures. Elementary problems of plates and shells. Material properties at elevated temperatures. Design procedures for elevated temperatures.

EGM 5816—Intermediate Fluid Dynamics (3) *Prereq: MAP 3302 and consent of instructor.* Vector calculus applied to the basic equations of fluid dynamics and transport phenomena.

EGM 5905—Individual Study (1-9; max: 9) *Prereq: EGM 3400, MAC 3314.* Individual research projects in solid and fluid mechanics at an advanced undergraduate, and beginning graduate level.

EGM 6215—Theory of Structural Vibrations I (4) *Prereq: EGM 4200.* Lagrange's equations. Multiple degree of freedom systems. Free and forced motions. Normal coordinates. Effect of damping. Use of matrix methods, computers, Rayleigh-Ritz and other approximation techniques.

EGM 6225—Theory of Structural Vibrations II (4) *Prereq: EGM 6215.* Longitudinal and torsional vibrations of bars, lateral vibrations of bars, membranes, and plates. Normal mode, lumped parameter, and transformation methods. Transmission and reflection of stress waves in isotropic elastic media.

EGM 6235—Nonlinear Vibrations I (4) *Prereq: EGM 4200 or 6215.* Phase plane and singular point methods. Limit cycles. Method of averaging. Application to one degree of freedom autonomous and nonautonomous systems. Nonlinear resonance. Stability of solutions. Parametrically excited systems. Method of perturbations.

EGM 6236—Nonlinear Vibrations II (3) *Prereq: EGM 6235.* Multiple degree of freedom systems. Averaging and perturbations. Systems with slowly varying parameters. Nonlinear continuous systems.

EGM 6245—Random Vibrations (3) *Prereq: EGM 6215.* Statistical analysis, response of discrete single and multiple degree of freedom dynamical systems to stationary random forces and parametric excitation. Extension to continuous systems and nonstationary excitation. Applications to engineering problems.

EGM 6250—Theoretical Acoustics (3) *Prereq: basic course in vibrations and some background with partial differential equations.* Fundamentals of wave phenomena in vibrating solid and fluid media. Analytical methods of attacking acoustical problems.

EGM 6321—Principles of Engineering Analysis I (3) *Prereq: MAP 5304* Solution of ordinary differential equations with variable coefficients. Method of Frobenius, classification of singularities, integral representations of solutions. Treatment of classical equations of Bessel, Legendre, Hermite and Mathieu. Asymptotic solutions using the WBK method and saddle-point technique.

EGM 6322—Principles of Engineering Analysis II (3) *Prereq: MAP 5304.* General methods for solving partial differential equations of first and second order. Classification into hyperbolic, elliptic, and parabolic types. Reduction to canonical form. Equations of wave propagation, heat conduction, and Laplace. Treatment of initial and boundary value problems.

EGM 6323—Principles of Engineering Analysis III (3) *Prereq: EGM 6322.* Dirichlet and Neumann boundary value problems. Green's function for Laplace's equation, conformal mapping spherical harmonics. Solution of the Helmholtz, Poisson, and biharmonic equations. Application to inviscid hydrodynamics, optical diffraction and gravitational potential theory.

EGM 6324—Principles of Engineering Analysis IV (3) *Prereq: MAP 5304.* Solution of Volterra and Fredholm integral equations of the first and second kind. Inversion of self-adjoint operators via Green's function, properties of symmetric kernels, Hilbert-Schmidt theory and the bilinear formula. Treatment of the singular integral equations of Abel and Carleman. Iteration and approximation techniques.

EGM 6325—Principles of Engineering Analysis V (3) *Prereq: EGM 6321.* Solution techniques for nonlinear differential and integral equations. Equations of Riccati, van der Pol, and Hammerstein. Elliptic functions and Painlevé transcendents. Phase plane, singular points, limit cycles and stability of autonomous systems. Similarity transforms and singular perturbation theory applied to nonlinear partial differential equations arising in hydrodynamics.

EGM 6341—Numerical Methods of Engineering Analysis I

(3) *Prereq: ESI 3502.* Variational principles. Minimum potential energy. Relaxation, Rayleigh-Ritz and Galerkin methods. Modern computer techniques.

EGM 6342—Numerical Methods of Engineering Analysis II (3) *Prereq: EGM 6341.* Trefftz's procedure. Prager's function space concept. Perturbation and collocation procedures. Use of computer.

EGM 6351—Introduction to Finite Element Methods (4) *Prereq: EGM 6611, 6652, or consent of instructor.* Finite element idealization of plane, axisymmetric and three-dimensional elasticity problems. Variational formulation of continuum and plate bending problems. Isoparametric elements and computational techniques. Extension to inelastic time varying and nonlinear field problems.

EGM 6422—Modern Techniques of Structural Dynamics (3) *Prereq: EGM 5421, 6215.* Modeling of complex structural systems occurring in aeronautical, mechanical, and structural engineering. Response of such systems to impulse, shock, and random excitations, emphasizing computer techniques.

EGM 6444—Advanced Dynamics I (3) *Prereq: EGM 5430.* Dynamics of particles and rigid bodies applied to advanced engineering problems utilizing variational and transformation principles.

EGM 6445—Advanced Dynamics II (3) *Prereq: EGM 6444.* Theory and application of Lagrangian equations to engineering problems. Hamilton-Jacobi theory and its applications.

EGM 6460—Stability of Dynamical Systems (3) *Prereq: EGM 4200 or 5430.* Basic concepts of stability, stability and asymptotic behavior of motion. Forced oscillations of systems with nonlinear characteristics. Floquet theory, Mathieu and Hill equations, Liapunov's direct method, criterion of Routh-Hurwitz, Popov and others.

EGM 6476—Inertial Guidance and Control (3) *Prereq: EEL 6614.* Modern navigational and vehicle guidance and control techniques based on use of inertial reference.

EGM 6478—Nonlinear Control Systems (3) *Prereq: EEL 5182.* Stability of nonlinear systems using Liapunov's second method, the Popov and other frequency domain criteria.

EGM 6551—Introduction to Theory of Thermal Stresses (3) *Prereq: EGM 5550.* Theory of thermal distortion and induced thermal stresses. Strain energy principles. Two- and three-dimensional problems. Creep. Thermal instability.

EGM 6584—Principles of Mechanics in Biomedical Engineering (3) *Prereq: EGM 6611.* Rheological behavior of biological materials subject to steady-state and dynamic loading. Mathematical models and analytical techniques used in the biosciences. Experimental techniques for material property investigation of representative body tissues.

EGM 6611—Continuum Mechanics I (3) *Prereq: EGM 3520.* Foundations of continuum mechanics. Analysis of motion and deformation. Conservation laws; tensor properties of stress and strain. Constitutive theory. Thermodynamics of continuous media.

EGM 6612—Continuum Mechanics II (3) *Prereq: EGM 6611.* Specific constitutive classes of continuous media; elastic solids, Newtonian and non-Newtonian fluids. Materials which exhibit plastic and viscoelastic behavior. Formulation of specific problems.

EGM 6613—Advanced Continuum Mechanics (3) *Prereq: EGM 6612.* Comprehensive, unified treatment of mathematical theories of solid and fluid mechanics, including gases.

EGM 6652—Introduction to Elasticity (3). *Prereq: EGM 3520.* Analysis of stress. Analysis of strain. Stress-strain relations of elasticity. Compatibility equations. Plane elasticity in Cartesian and polar coordinates.

EGM 6653—Theory of Elasticity I (3) *Prereq: EGM 6652.* Solution of two-dimensional problems by means of complex variable methods. Energy principles and variational methods.

EGM 6654—Theory of Elasticity II (3) *Prereq: EGM 6653.* Three-dimensional problems including torsion, bending, stress concentration, thermal stress, and stress-wave propagation.

EGM 6670—Introduction to Inelastic Behavior of Materials (3) *Prereq: EGM 3520, MAP 5304.* Fundamental inelastic theory including plasticity and viscoelasticity. Applications to beams, bars, rings, and plates. Dynamic inelastic effects. Problems in creep and stress relaxation.

EGM 6671—Theory of the Inelastic Continuum (3) *Prereq: EGM 6611, 6670.* Stress and strain in inelastic media. Flow, deformation, and incremental theories. Ideally plastic media.

EGM 6682—Theory of Viscoelasticity (3) *Prereq: EGM 6611, 6670.* Theories of solid and fluid materials which exhibit history dependence. Development from Boltzmann linear viscoelasticity to general thermodynamic theories of materials with memory.

EGM 6683—Dynamic Plasticity (3) *Prereq: EGM 6611, 6670.* Analysis of propagation of impact-induced transient loading and unloading waves of uniaxial stress or strain in inelastic solids. Rate-dependent and rate-independent constitutive assumptions. Experimental verifications. Combined stress waves.

EGM 6684—Special Topics in Dynamic Plasticity (1-4; max: 9) *Prereq: EGM 6683.*

EGM 6716—Theory of Plates (3) *Prereq: EGM 6611.* Fundamental equations for the bending and stretching of thin plates with small deformations. Large deformations of plates with nonlinear considerations. Energy methods applied to plate problems. Thermal stresses in plates.

EGM 6717—Introduction to Plates and Shells (3) *Prereq: EGM 3520.* Small-deflection theory of plates. Boundary conditions. Rectangular and circular plates. Energy methods. Large deflections of plates. Orthogonal curvilinear coordinates. Surfaces of shells. Membrane theory of shells. Bending of shells of revolution.

EGM 6718—Methods of Analysis for Plates and Shells (3) *Prereq: EGM 6726.* Application of various approximate shell theories to engineering problems and the methods of solution. Numerical analysis of shells.

EGM 6726—Theory of Shells (3) *Prereq: EGM 6716.* General theory of deformation of thin shells. Static analysis of shells, shells of revolution, dynamics of shells.

EGM 6736—Theory of Elastic Stability (4) *Prereq: EGM 6717 or 6726.* Stability criteria. Elastic stability of bars, frames, plates; cylindrical, conical, spherical, and shallow shells. Postbuckling behavior of plates. Plates and shells under dynamic loading.

EGM 6811—Theory of Fluid Flow I (4) *Prereq: EGM 5816.* Concepts of velocity potential, differential equations of motions, continuity, and state. Practical solutions of two- and three-dimensional flow.

EGM 6812—Theory of Fluid Flow II (3) *Prereq: EGM 6811.* Concepts of velocity potential, stream function, and irrotational flow. Application of conformal transformations to two-dimensional flow.

EGM 6813—Theory of Fluid Flow III (4) *Prereq: EGM 6811.* Differential equations of constant density viscous fluid flow and their exact and approximate solutions. Laminar and turbulent boundary layers. Magnetohydrodynamic effects.

EGM 6835—Boundary Layer Theory (4) *Prereq: EGM 6813.* Variable density laminar and turbulent boundary layers. Transformations to constant density flow. Integral methods. Mass transfer, diffusion, chemical reactions, extraneous effects.

EGM 6845—Theories of Turbulent Flows (4) *Prereq: EGM 6811, EEL 6544.* Mathematical theory of the turbulent motion of fluids. History and introduction to contemporary research in the statistical theory of turbulence.

EGM 6905—Individual Study (1-9; max: 18)

EGM 6910—Supervised Research (1-5)

EGM 6934—Special Topics in Engineering Mechanics (1-9; max: 18)

EGM 6936—Graduate Seminar (1; max: 10) Discussions and presentations in the fields of graduate study and research. S/U.

EGM 6940—Supervised Teaching (1-5)

EGM 6971—Research for Master's Thesis (1-15)

EGM 7980—Research for Doctoral Dissertation (1-15)

ENGLISH

College of Liberal Arts and Sciences

GRADUATE FACULTY 1979-80

Acting Chairman: M. New. *Graduate Coordinator:* J. M. Perlette. *Graduate Research Professor:* A. L. Williams. *Distinguished Service Professor:* T. W. Herbert.

Professors: G. E. Bigelow; R. A. Bryan; C. S. Carnell; W. C. Childers; H. E. Crews; W. L. Frazer; R. H. Green; W. Hellstrom; M. S. Kirkpatrick; M. New; P. Lisca; J. B. Pickard; W. R. Robinson; H. M. Stahmer; T. R. Waldo. *Associate Professors:* B. J. Anderson; T. K. Beyette; R. E. Brantley; A. C. Bredahl, Jr.; R. H. Carpenter; I. G. Clark III; A. G. Cranney, Jr.; M. F. Deakin; A. M. Duckworth; R. C. Foreman, Jr.; S. H. Gale; M. A. Hill-Lubin; S. R. Homan, Jr.; R. B. Kershner, Jr.; K. M. McCarthy; J. M. Perlette; C. G. Snodgrass; R. M. Thompson; C. E. Tillman; J. B. Twitchell; G. Ulmer; J. F. Vogel. *Assistant Professors:* D. M. Locke; W. A. Losano; M. Nelson; R. S. Thomson.

The Department of English offers the Master of Arts with specialization in literature, creative writing, community college teaching, and linguistics and the Doctor of Philosophy with specialization in literature and linguistics. A nonthesis option for the Master of Arts is offered with specialization in literature and community college teaching as is a Master of Arts in Teaching with a major in English.

Specific areas of specialization for the Doctor of Philosophy include linguistics, Medieval, Renaissance, Restoration and 18th-century, 19th-century British, American literature to 1900, contemporary British and American literature. Specialization in the literary study of film, rhetoric, and folklore is also possible.

New graduate students should have completed an undergraduate English major of at least 36 quarter hours, while doctoral students should have a Master of Arts degree in English. All graduate students must take a course in bibliography and methods of research, and doctoral students must complete an internship in college teaching.

AML 6341—Studies in American Literature Before 1900 (4; max: 16)
AML 6342—Studies in 20th-Century American Literature (4; max: 16)
CRW 6250—Fiction Writing (4; max: 16)
CRW 6350—Verse Writing (4; max: 16)
CRW 6550—The Writing of Children's Literature (4; max: 16)
ENG 5905—Special Study in English (1-5)
ENG 6063—Bibliography and Methods of Research (4)
ENG 6143—The Language of Film (4) Use of film in teaching English composition, literature, and the humanities.
ENG 6144—Studies in the Movies (4; max: 16)
ENG 6154—Communications and Popular Culture (4) Study of the origins and qualities of the popular arts in modern society.
ENG 6217—Studies in Fiction (4; max: 16)
ENG 6437—Studies in Drama (4; max: 16)
ENG 6595—Studies in English Linguistics (4)
ENG 6718—Stylistics (4)
ENG 6755—Studies in Verse (4; max: 16)
ENG 6839—Studies in Literary Criticism (4; max: 16)
ENG 6905—Individual Work (1-4; max: 16)
ENG 6910—Supervised Research (1-5)
ENG 6971—Research for Master's Thesis (1-15)
ENG 7938—Seminar in Variable Topics (1-5; max: 16)
ENG 7980—Research for Doctoral Dissertation (1-15)
ENL 6148—Studies in Shakespeare (4)
ENL 6304—Studies in Old English (4; max: 16)
ENL 6314—Studies in Middle English (4; max: 16)
ENL 6323—Studies in Renaissance Literature (4; max: 16)
ENL 6394—Studies in Restoration and 18th-Century Literature (4; max: 16)
ENL 6425—Studies in 19th-Century British Literature (4; max: 16)
ENL 6447—Studies in 20th-Century British Literature (4; max: 16)
LAE 6379—The Teaching of Business and Technical Writing (4)
LAE 6940—Supervised Teaching (1-5)
LAE 6947—Practicum in the Teaching of College English (4)
LIN 7938—Seminar in Linguistics (4; max: 16)
LIT 6283—Studies in Folklore (4; max: 16)
LIT 6373—Studies in Irish Literature (4; max: 16)
LIT 6934—Variable Topics (1-5; max: 16)
RED 6380—Principles of Community College and Adult Reading Instruction (4) Study of the psychology of adult learners, diagnosis of reading problems, and teaching the skills of the reading process.
RED 6480—Laboratory in Community College and Adult Reading Instruction (4) Observation of and instruction by in-service community college teachers in diagnosis, materials, and study skills.
SPC 6239—Studies in Rhetorical Theory (4) Variable topics in the theory and history of rhetoric.

ENTOMOLOGY AND NEMATOLOGY
College of Agriculture

GRADUATE FACULTY 1979-80

Acting Chairman: G. C. Smart, Jr. *Graduate Coordinator:* S. H. Kerr. *Graduate Research Professor:* R. I. Sailer. *Professors:* G. E. Allen; D. W. Anthony; R. M. Baranowski; L. Berner; J. E. Brogdon; R. F. Brooks; A. K. Burditt; W. F. Buren; P. S. Callahan; D. L. Chambers; E. W. Clark; H. L. Cromroy; D. A. Dame; A. G. B. Fairchild; D. H. Habeck; S. H. Kerr; G. C. LaBrecque; J. E. Lloyd; C. S. Lofgren; M. S. Mayer; P. B. Morgan; J. L. Nation; H. Oberlander; A. Overman; V. G. Perry; S. L. Poe; R. H. Roberts; F. A. Robinson; G. C. Smart, Jr.; B. J. Smittle; J. R. Strayer; A. C. Tarjan; T. J. Walker; H. V. Weems, Jr.; D. E. Weidhaas; M. J. Westfall, Jr.; W. H. Whitcomb; R. C. Wilkinson, Jr. *Associate Professors:* J. F. Butler; D. A. Carlson; D. W. Dickson; J. H. Frank; D. W. Hall; M. D. Huettel; R. L. Lipsey; R. E. Lowe; C. W. McCoy, Jr.; D. R. Minnick; E. R. Mitchell; J. K. Nayer; R. S. Patterson; J. A. Reinert; H. L. Rhoades; J. A. Seawright; D. J. Schuster; D. E. Short; D. L. Silhacek; J. H. Tumlinson, III; K. W. Vick; R. E. Waites; B. R. Wiseman; R. E. Woodruff; R. B. Workman. *Assistant Professors:* T. R. Ashley; J. C. Ball; C. S. Barfield; R. A. Dunn; S. M. Ferkovich; D. A. Focks; J. L. Foltz; P. D. Greany; A. B. Hamon; D. C. Herzog; F. A. Johnson; P. G. Koehler; N. C. Leppla; E. L. Matheny, Jr.; J. R. McLaughlin; C. A. Musgrave; J. R. Rich; J. L. Sharp; J. L. Stimac; D. Stokes; J. H. Tsai; V. H. Waddill; D. F. Williams; D. R. Wojcik.

The Department of Entomology and Nematology offers the Master of Agriculture, Master of Science, and Doctor of Philosophy degrees in entomology and nematology. Members of the graduate faculty include the departmental resident faculty, faculty located on University of Florida campuses away from Gainesville, scientists of the U.S. Department of Agriculture, and scientists with other State of Florida agencies such as the Division of Plant Industry, Florida State Department of Agriculture and Consumer Service. The graduate faculty is qualified to direct graduate students in all specialties of entomology, nematology, and acarology.

New graduate students should have background in biology, chemistry, physics, and mathematics and knowledge of basic entomology or nematology. Minor deficiencies may be made up after entering graduate school.

General requirements for graduate degrees are established by the Graduate School and listed elsewhere in this *Catalog*. A specific program of study is prepared by the appointed supervisory committee

for each student. Supervisory committees for students pursuing the Ph.D. will plan programs of study having at least 90 hours of graduate credit other than thesis or dissertation research. As many as 45 of these hours may be transferred from another graduate school. Ph.D. qualifying examinations are administered by the student's supervisory committee plus two other faculty members appointed by the chairman of the department.

ENY 5561—Tropical Entomology (4) *Prereq: ENY 3005 or 3004 or equivalent.* Biologies, life histories, and various approaches to control of major agricultural insect and arachnid pests encountered in the tropics.
ENY 5781—Tropical Plant Nematology (4) *Prereq: ENY 3701 or equivalent.* Plant parasitic nematodes and the diseases they cause to plants of tropical and subtropical areas of the world.
ENY 6151—Insect Systematics (5) *Prereq: ENY 4161 and PCB 4675 or consent of instructor.* Principles of systematics as they apply to insects. Nomenclature, phenetics, phyletics, evolution, and zoogeography.
ENY 6202C—Quantitative Approaches to Insect Ecology (5) *Prereq: ENY 6203 or equivalent and STA 6166 or equivalent.* Quantitative methods for describing and studying insect populations, computer simulation of insect-plant system dynamics, applications of modeling to insect ecology.
ENY 6203—Insect Ecology (5) *Prereq: PCB 4043 or consent of instructor.* Ecology of insects with special emphasis on evolutionary and population aspects. Discussions of primary literature; field projects.
ENY 6241—Biological Control of Insects (5) *Prereq: ENY 3005.* Principles involved in the natural and biological control of insects.
ENY 6261—Insect Resistance in Crop Plants I (4) Principles of plant resistance to insects.
ENY 6262—Insect Resistance in Crop Plants II (3) Methods of developing plant resistance to insects.
ENY 6321—Comparative Anatomy of the Hexapoda (5) *Prereq: ENY 4353.* Includes comparative histology of selected species, with reference to the new electron microscopy findings; the laboratory will cover insect histological techniques.
ENY 6401—Insect Physiology (5) *Prereq: ENY 4353, organic chemistry or equivalent.* Physiological study of the various organs and tissues of insects.
ENY 6451—Insect Behavior (5) Principles of animal behavior with an evolutionary perspective. Genetics, physiology, ecology, and evolution of behavior; especially communication, reproduction, predator-prey interactions. Field and research work, critiques and discussions.
ENY 6502—Aquatic Insects (5) *Prereq: ENY 4161.* Life histories and ecologies of aquatic insects.
ENY 6581—Acarology (5) *Prereq: ENY 3005.* Morphology, phylogeny, taxonomy, and economic importance of mites.
ENY 6591—Mosquitoes (5) *Prereq: ENY 4660.* Collection, identification, bionomics and relationship to the health of man.
ENY 6601—Growth and Development in Insects (4) Analysis of insect development, with emphasis on determination, pattern, formation, regeneration, and hormone action.
ENY 6611—Immature Insects (5) *Prereq: ENY 4161.* Structure and identification of immature forms of insects, especially the Holometabola.
ENY 6651—Insect Toxicology (3) *Prereq: ENY 3005, organic chemistry or equivalent.* Structure, nomenclature, mode of action, and metabolism of chemicals used in arthropod control; environmental impact of these chemicals.
ENY 6661—Medical Entomology (5) *Prereq: ENY 4660.* Arthropods (except mosquitoes) parasitic on man: collection, identification, and bionomics of local species.
ENY 6663—Veterinary Entomology (5) *Prereq: ENY 4660.* Arthropods parasitic on animals: biology, control, and host arthropod interaction. Collection, identification, and bionomics of arthropods affecting animals other than man.
ENY 6711—Taxonomy of Nematodes (5) *Prereq: ENY 6731.* Taxonomy and identification of members of the Phylum Nemata.
ENY 6723—Advanced Plant Nematology (5) *Prereq: ENY 5781 or equivalent.* Behavior, biology, population dynamics, host-parasite interaction, and control of plant parasitic nematodes. Offered in even-numbered years only.
ENY 6731—Nematode Morphology and Physiology (5) *Prereq: ENY 3701.* Anatomical study of the organs of nematodes and their vital functions.
ENY 6780C—Marine Nematology (4) *Prereq: consent of instructor.* Taxonomy, morphology, physiology, ecology, and life cycles of free living marine nematodes.
ENY 6801—Radiation in Insect Studies (5) *Prereq: consent of instructor.* Specialized topics and current research on radiation in entomology.
ENY 6810—Information Techniques in Entomology (1) Sources of entomological information and methods for acquiring, storing, and retrieving it.
ENY 6821—Insect Pathology (5) *Prereq: MCB 3013 or consent of instructor.* Interrelationship of insects and pathogenic microorganisms; history, classification, morphology, mode-of-action, and epidemiology of entomogenous bacteria, viruses, protozoa, and fungi.
ENY 6822—Microbial Control of Insects (3) Principles of the utilization of insect pathogens in arthropod control: mass production, safety, compatibility with other control methods, utilization of natural epizootics and the role of pathogens in pest management programs.
ENY 6905—Problems in Entomology and Nematology (1-6; max: 12) Individual study under faculty guidance. Student and instructor to agree on problem and credits prior to registration.
ENY 6910—Supervised Research (1-5)
ENY 6932—Special Topics in Entomology and Nematology (1-2; max: 6) Reports and discussions pertaining to selected topics announced in advance. S/U.
ENY 6934—Selected Studies in Entomology and Nematology (1-5; max: 12) Current issues. Subject matter variable, may be repeated with different subject each time.
ENY 6940—Supervised Teaching (1-5)
ENY 6971—Research for Master's Thesis (1-15)
ENY 6986—Research Techniques in Entomology (5) Demonstration and use of modern techniques, equipment, and procedures in research on insects. Conducted principally in the U.S.D.A. Entomology Research Laboratory.
ENY 7980—Research for Doctoral Dissertation (1-15)

ENVIRONMENTAL ENGINEERING SCIENCES
College of Engineering

GRADUATE FACULTY 1979-80

Chairman & Graduate Coordinator: E. E. Pyatt. *Graduate Research Professor:* H. T. Odum. *Professors:* H. A. Bevis; W. E. Bolch, Jr.; P. L. Brezonik; B. G. Dunavant; T. deS. Furman; J. P. Heaney; D. A. Lundgren; E. E. Pyatt; J. E. Singley; P. Urone. *Associate Professors:* G. Bitton; W. C. Huber; C. E. Roessler; J. Zoltek, Jr. *Assistant Professors:* T. L. Crisman; K. C. Ewel.

Graduate study is offered leading to the degrees of Master of Engineering, Master of Science, Engineer, and Doctor of Philosophy in the field of environmental engineering sciences. Areas in which the student may specialize include air resources, water supply and water pollution control, environmental resources management, environmental biology, water chemistry, radiological health, solid wastes; and systems ecology and energy analysis.

Both master's degrees are available in cooperation with the Departments of Civil and Coastal and Oceanograhic Engineering with an area of concentration in public works engineering.

Direct admission into the Master of Science program requires a bachelor's degree in engineering or in a basic science such as chemistry, physics, biology, or mathematics. Persons with a degree in a nontechnical

field may also be admitted into this program upon the completion of specified articulation.

Direct admission into the Master of Engineering program requires that the student be a graduate engineer. Other persons wishing to enter this program will be required to take articulation work sufficient to bring their backgrounds into substantial agreement with those with undergraduate engineering training. The Master of Engineering degree is accredited by the Engineers' Council for Professional Development (ECPD). The specific program of study must be approved by the student's supervisory committee.

It normally requires one calendar year to complete the requirements for a master's degree. If articulation work is required, it may take longer, depending upon the extent of the student's deficiency.

The following *Engineering Common Courses* are available for graduate major credit: EGN 6740—Surface Hydrology; EGN 6741—Operational Hydrology I; EGN 6742—Operational Hydrology II.

EES 5007—Ecological and General Systems (4) *Prereq: MAP 3302 or consent of instructor.* Systems ecology, including examples, languages, theoretical formulations, and models for design, synthesis, and prediction of systems of man and nature.

EES 5105—Environmental Biology (4) *Prereq: consent of instructor.* Basic cellular organization and processes related to waste treatment. Role of environmental engineering in maintaining stability of fresh water, marine, and terrestrial ecosystems.

EES 5245—Water and Wastewater Analysis (4) *Prereq: three quarters of general chemistry.* Principles of analytical chemistry and their applications to determination of chemical composition of natural waters. Emphasis on methods used in routine determinations of water quality and wastewater strength.

EES 5306—Ecological Engineering Seminar (2) *Prereq: consent of instructor.* Principles of environmental design and means for guiding self-design of systems of nature and man, including review of manageable ecological systems, regional patterns, technological interfaces, new approaches, and literature.

EES 6006—Health Hazards of Man's Environment (4) *Prereq: basic biology.* Environmental factors which adversely affect man's well-being are related to epidemiology and human physiology.

EES 6036—Environmental Instrumentation (3) Basic instrumentation and instrumental techniques for the measurement of environmental parameters and pollutants.

EES 6106—Environmental Microbiology (4) Interaction between microbial populations. Behavior of microorganisms in fresh water, marine, and soil environments. Stress of pollution on microbial communities.

EES 6136—Biology of Aquatic Systems (4) Macroscopic plant and animal forms which may serve as indicators of water quality in streams and lakes.

EES 6166—Aquatic Microbiology (4) Role of microorganisms in fresh and marine waters which receive waste effluents or are used as public water supplies. Emphasis on phytoplankton.

EES 6207—Environmental Chemistry (4) *Prereq: one year of general college chemistry or consent of the instructor.* This is a survey course in the application of chemical principles of environmental problems. Aspects of chemical control of the quality of air, earth, and water will be covered.

EES 6208—Principles of Water Chemistry I (3) *Prereq: EES 6207.* Application of chemical principles to reactions and composition of natural waters; emphasis on equilibrium and thermodynamic concepts.

EES 6209—Principles of Water Chemistry II (3)

EES 6246—Advanced Water Analysis (4) Advanced chemical procedures used in water chemistry research. Application of instrumental methods for determination of trace inorganic and organic natural water constituents.

EES 6355—Pollution Transport Systems (4) *Prereq: MAP 3302, EGN 3353.* Distribution of pollutants in natural waters and the atmosphere. Diffusive and advective transport phenomena. Analytical and numerical prediction methods.

EES 6356—Estuarine Systems (4) Coastal systems, their components, processes, systems, models and management including tropical, arctic, and man-affected types, field trip and literature review.

EES 6506—Occupational Health (4) Effects, assessment, and control of physical and chemical factors in man's working environment, including chemical agents, electromagnetic radiation, temperature, humidity, pressures, illumination, noise, and vibration.

EES 6936—Water Science Seminar (1-5; max: 9) Chemical, physical, and biological science of the behavior of natural waters presented by area specialists.

ENV 5005—Environmental Health (4) Effects of environmental pollution upon health. Methods of evaluation, treatment, and prevention of pollutants of health significance.

ENV 5126—Introduction to Air Pollution (4) Principal types, sources, dispersion, effects, and physical, economic, and legal aspects of control of atmospheric pollutants.

ENV 5206—Survey of Radiological Health (4) Oriented toward ENV majors not specializing in radiological health. Quantitative overview of radiation principles, sources, detection, measurement, and protection.

ENV 5306—Municipal Refuse Disposal (3) Quantities and characteristics of municipal refuse. Collection methods, transfer stations, equipment, and costs. Refuse disposal practices, regional planning, and equipment.

ENV 5517—Treatment of Wastewater (4) *Prereq: ENV 4514, EES 5245 or consent of instructor.* In-depth study of the physical, chemical, and biological processes utilized in the treatment of wastewater, with special emphasis on cause and effect of physical and biological actions.

ENV 5930—Special Topics in Environmental Engineering I (1-5; max; 12) *Prereq; consent of instructor.* Laboratory, lectures, or conferences covering specially selected topics.

ENV 6006—Graduate Environmental Engineering Seminar (1-2) S/U.

ENV 6115—Air Pollution Control Design (4) Design, analysis, operational limitations, cost and performance evaluation of control processes and equipment. Field visits to and inspection of industrial installations.

ENV 6116—Air Pollution Sampling and Analysis (4) Determination of the concentration of normally encountered ambient pollutants. Methodology of source sampling. Practical experience in ambient and source sampling.

ENV 6117—Environmental Meteorology (4) Dynamics and thermodynamics of the atmosphere related to environmental problems. Analysis of weather charts. Numerical weather prediction models.

ENV 6118—Atmospheric Dispersion Modeling (4) Prediction of downwind pollutant concentrations from point, line, and area sources. Theory of turbulence and phenomena related to problems in diffusion and dispersion of contaminants in the lowest layer of the atmosphere.

ENV 6130—Aerosol Mechanics (4) Generation, collection, and measurement of aerosols. Theory of the fluid dynamic, optical, electrical, and thermal behavior of gas-borne particles.

ENV 6211—Health Physics (4) *Prereq: ENU 5615L.* Techniques of hazard evaluation and radiation control; monitoring methods; survey techniques; biological sampling; instrument calibration; exposure standards and radiation protection regulation; on-site radiation safety surveys and evaluation.

ENV 6216—Radioactive Wastes (4) *Prereq: ENV 5517, 5206.* Source, treatment, and disposal of radioactive wastes. Emphasis on prevention of environmental contamination.

ENV 6236—Radiological Techniques (5) *Prereq: ENV 5206.* Application of radiological techniques to environmental engineering. Theory and operation of advanced detection instrumentation. Laboratory experiments on measurement and control of radionuclides in the environment.

ENV 6286—Electronic Product Radiation (4) *Prereq: undergraduate course in modern physics.* Evaluation of hazards, application of standards and engineering of controls for any electromagnetic or particulate radiation from an electronic device, especially microwave sources, lasers, and all types of electronic components emitting x-rays.

ENV 6409—Advanced Water Treatment Process Design (5) *Prereq: EES 5245, 6207, or consent of instructor.* Advanced concepts in chemical processes of examination and treatment of potable water.
ENV 6437—Advanced Environmental Engineering Design I (5) *Prereq: ENV 6516.* Layout and design of sanitary sewage systems, pumping stations, force mains, wastewater treatment plants, and methods of effluent disposal. Design parameters, cost, and financing.
ENV 6438—Advanced Environmental Engineering Design II (5) Development of water supplies, layout and design of distribution systems, pumping and storage facilities, and water treatment plants. Design parameters, cost, and financing.
ENV 6516—Advanced Waste Treatment Operations (4) *Prereq: ENV 5517.* Biological, physical, and chemical processes used in the treatment of domestic and industrial wastewater. Development of design parameters and operating procedures based on experimentally derived data.
ENV 6606—Environmental Resource Systems (4) Standards and criteria for evaluation of environmental resources projects. Formulation of mathematical models and environmental problems. Application of systems engineering and operations research as aids in decision making.
ENV 6656—Urban Environmental Problems (4) Overall problem of developing and maintaining high quality physical environment in urban areas. Systems analysis approach to air, land, and water quality management problems.
ENV 6666—Water Quality Management (4) *Prereq: consent of instructor.* Water quality management applied to streams, lakes, and tidal estuaries and embayments. Influence and effects of municipal and industrial wastes on public water supplies, shellfish, storage, recreational uses, industrial uses, and wildlife.
ENV 6905—Individual Work (1-5; max: 12) Faculty-supervised individual research or study of material not covered in formal courses.
ENV 6910—Supervised Research (1-5)
ENV 6916—Nonthesis Project (1-3; max: 3) Individual project under faculty guidance to satisfy requirement for nonthesis master's degree.
ENV 6932—Special Problems in Environmental Engineering (1-5; max: 12)
ENV 6940—Supervised Teaching (1-5)
ENV 6971—Research for Master's Thesis (1-15)
ENV 7980—Research for Doctoral Dissertation (1-15)

FINANCE AND INSURANCE
College of Business Administration

GRADUATE FACULTY 1979-80

Chairman: A. A. Heggestad. *Graduate Coordinator:* R. H. Pettway. *Graduate Research Professor:* E. F. Brigham. *Professors:* L. C. Andersen; F. D. Arditti; A. A. Heggestad; W. M. Howard, C. A. Matthews; R. H. Pettway. *Associate Professors:* W. A. McCollough; D. J. Nye; R. C. Radcliffe; J. G. Richardson. *Assistant Professors:* R. L. Crum; S. Manaster.

The Department of Finance, Insurance, and Real Estate offers the nonthesis degree, Master of Business Administration, and the thesis degree, Master of Arts, in finance with specializations in financial management, financial markets and institutions, and investments. It also offers a major and minor in the Doctor of Philosophy degree in business administration. Each of these degrees is also offered in risk and insurance.

New graduate students should have adequate undergraduate training in mathematics and statistics or be willing to devote sufficient time to acquire the necessary foundation in these areas. Though no graduate major may be completed without adequate course work on the 5000 or higher level, certain undergraduate courses in finance and insurance are available for graduate credit as a part of a candidate's major. These include RMI 4135 and 4805.

For admission to courses 5000 level and above, the student must have been admitted to the Graduate School and normally should have undergraduate courses in fields pertinent to the graduate courses selected; or, where necessary, special arrangements may be made with the approval of the department chairman.

FIN 5354—Financial Markets and Institutions (4) *Prereq: intermediate macroeconomics.* Financial management of financial institutions in a regulatory and market environment.
FIN 5405—Business Financial Management (4) *Required of all MBA degree candidates who have had no basic business finance course. Prereq: ACC 5011.* Analysis of business financing and investing decisions.
FIN 5425—Corporate Finance (4) *Prereq: FIN 4414 or consent of instructor.* The application of business finance problems. Students prepare written solutions to case problems.
FIN 5525—Security Markets and Pricing (4) *Prereq: FIN 5405 or consent of instructor.* An examination of security market structure and the theory of security selection and pricing.
FIN 6246—Money and Capital Markets (5) *Prereq: FIN 4244, college-level mathematics, and statistics.* Financial markets, with emphasis on flow of funds, interest rate determination, and allocation of resources.
FIN 6446—Problems in Corporate Finance (5) *Prereq: FIN 6937 or consent of instructor.* The firm's investment and financing decisions are analyzed under conditions of uncertainty in theory/practice format.
FIN 6456—Quantitative Analysis of Financial Decisions (5) *Prereq: MAN 5511 or consent of instructor.* Application of quantitative methods to the solution of specific financial problems with special reference to mathematical programming, simulation, and other methods of discrete optimization.
FIN 6816—Seminar in Investments (5) *Prereq: FIN 5524.* Individual research and group discussion employing materials from publications and reports by governmental agencies and groups in industry.
FIN 6826—Seminar in Financial Institutions (5) *Prereq: FIN 4313 and/or FIN 5354.* Monopoly and competition as applied to banking; bank organization and structure, adequacy of bank capital, problems of asset management and providing successor management.
FIN 6905—Individual Work in Finance (1-5; max: 10) *Prereq: permission of department and Director of Graduate Studies.* Reading and/or research in finance as needed by graduate students.
FIN 6940—Supervised Teaching (1-5)
FIN 6971—Research for Master's Thesis (1-15)
FIN 7808—Theory of Finance I (5) Normative investment and financing criteria examined for the individual and the corporation when capital markets are imperfect and investment returns uncertain.
FIN 7809—Theory of Finance II (5) Mean-variance and state preference approaches to security market equilibrium; efficacy of stochastic dominance rules in ordering uncertain prospect and the multiperiod portfolio decision.
FIN 7938—Finance Research Workshop (4; max: 8) Analysis of current research topics. Paper presentation and critiques by doctoral students, faculty, and visiting scholars.
FIN 7980—Research for Doctoral Dissertation (1-15)
RMI 6195—Seminar in Life Insurance (5) *Prereq: RMI 4135.* Problems in life insurance and related fields.
RMI 6296—Seminar in Property and Liability Insurance (5) *Prereq: RMI 3206, 3207.* Meaning, economic influences, social values, principles and practices of property and liability insurance.
RMI 6910—Supervised Research (1-5)
RMI 6936—Problems in Risk Management (3) Insurance hazards of business concerns and governmental units, with consideration of insurance protection available.

FOOD AND RESOURCE ECONOMICS
College of Agriculture

GRADUATE FACULTY 1979-80

Chairman: L. Polopolus. *Graduate Coordinator:* W. W. McPherson. *Graduate Research Professor:* W. W. McPherson. *Professors:* C. O. Andrew; D. L. Brooke; H. B. Clark; C. D. Covey; K. W. Kepner; M. R. Langham; J. W. Milliman; L. H. Myers; L. Polopolus; C. N. Smith; J. R. Strain; K. R. Tefertiller; M. L. Upchurch. *Associate Professors:* J. C. Cato; C. G. Davis; J. K. Dow; R. D. Emerson; G. F. Fairchild; J. R. Gordon; J. Holt; C. F. Kiker; W. K. Mathis; F. J. Prochaska; J. E. Reynolds; J. R. Simpson; R. W. Ward; G. A. Zepp. *Assistant Professors:* J. Alvarez; R. R. Carriker; K. C. Clayton; W. A. Colette; D. L. Gunter; R. L. Kilmer; J. Y. Lee; G. D. Lynne; B. E. Melton; J. W. Milon; W. D. Mulkey; T. H. Spreen; D. S. Tilley; P. J. van Blokland; G. B. Wall.

The degrees of Master of Agriculture Management and Resource Development (MAMRD), Master of Science, and Doctor of Philosophy are offered. Areas of specialization include agricultural business management, marketing, production, economic development, econometrics, and resource and environmental economics. The department participates in the programs of the Centers for Latin American Studies, African Studies, Tropical Agriculture, Rural Development, and Environmental Programs, and the University Sea Grant College.

Students who hold a bachelor's degree with their major fields of study in areas other than food and resource economics should consult with the graduate coordinator concerning acceptance for graduate study.

In addition to the courses listed, there are seminars for organized discussion of current topics and for review of graduate students' research.

AEB 5612—Foreign Agricultural Development Planning (5) *Prereq: AEB 3103.* Special reference given to low-income countries.

AEB 6182—Intermediate Agricultural Production Economics (4) Basic concepts of producer choice and theory of the film.

AEB 6184—Economics of Agricultural Production I (5) *Prereq: AEB 4511, 6182.* Producer decisions including theoretical and empirical problems of multifactor, multiproduct and polyperiod cases under different market structures. Input demand and product supply functions at the commodity and industry levels.

AEB 6186—Economics of Agricultural Production II (5) *Prereq: AEB 6184.* Firm growth, effects of risk and uncertainty on producer choice and an introduction to probabilistic theory of the firm. Relation between aggregate consequences of producer behavior and social welfare.

AEB 6252—Foundations of Agricultural Policies (3) *Prereq: ECO 4101.* Policy-making processes. Relationships among economic, political, and social goals and actions which shape the institutions of the agricultural economy and its relations with other sectors.

AEB 6263—Agricultural Policies and Programs in the U.S. (3) *Prereq: AEB 4224, ECO 4205.* Relations between goals and programs in historical perspective. Effects of policies on output, prices and income.

AEB 6363—Intermediate Consumption Economics and Agricultural Marketing (4) *Prereq: ECO 4101.* Consumer choice and demand; form, temporal and spatial dimensions of prices and product distribution.

AEB 6373—Consumption and Demand (5) *Prereq: AEB 4511; AEB 6363 or ECO 4101.* Theories of consumer behavior in static and dynamic contexts; analysis of household expenditure and demand.

AEB 6383—Industrial Organization of Agricultural Markets (4) *Prereq: ECO 3100 or 4101.* Market structure, conduct, and performance. Evaluation of current public policy and institutional arrangements.

AEB 6384—Marketing Economics in Agriculture (4) *Prereq: AEB 6363, 6553.* Integration of the components of marketing. Advertising, information, consumer behavior, location of activity, storage, market power, and regulation.

AEB 6385—Management Strategies for Agribusiness Firms (4) *Prereq: ECO 4101.* Planning, organizing and implementing management functions of finance, production, and marketing.

AEB 6429—Research Seminar in Econometrics (1-5) *Prereq: AEB 6571.* Advanced topics and empirical measurement in applied economics.

AEB 6453—Natural Resource Economics (4) *Prereq: AEB 6182 and AEB 6363, or ECO 6116, or consent of instructor.* Resource use, management, development, and conservation. Institutional and market performance in providing socially desired outcomes.

AEB 6455—Natural Resource Institutions (4) *Prereq: AEB 6453 or consent of instructor.* Philosophy and history of property rights and taxation; their effects on resource use, output, values, and income distribution; cost-benefit analysis.

AEB 6465—Natural Resource Policy (4) *Prereq: AEB 6453 or consent of instructor.* Role of individuals, groups, and government agencies in resolving conflicts and improving resource use and development.

AEB 6483—Regional Policy and Development (5) *Prereq: AEB 6625.* Regional policy, objectives, and multiple goal decision making. Decision models for regional planning; input-output, linear programming, and simulation techniques.

AEB 6533—Nonstochastic Models (5) *Prereq: ESI 4567.* General linear programming model and its basic theorems, integer and nonlinear programming. Spatial equilibrium, input-output, and game theory models.

AEB 6553—Elements of Econometrics (4) *Prereq: AEB 3103, 4511; STA 3023.* Econometric problem solving and determining quantitative relationships among economic variables in agriculture and related industries.

AEB 6571—Econometric Methods I (5) *Prereq: STA 4322, ESI 4567.* Stochastic models. General linear model and problems associated with its use in econometric research. Theory of the simultaneous equations approach, model construction, and estimation techniques.

AEB 6572—Econometric Methods II (5) *Prereq: AEB 6571.* Single equation topics; errors in variables, nonspherical disturbances, and lagged variables. Dynamic simultaneous equation models and topics in multivariate analysis.

AEB 6592—Activity Analysis for Economic Decisions (4) *Prereq: AEB 4511.* Simplex method, primal-dual relationships. Applications of modeling techniques including separable programming and specification of risk. Quadratic programming.

AEB 6625—Regional Economics (5) *Prereq: ECO 4205, 4101.* Definitions of regions and elements of regional economic analysis. Location theory, regional interdependence, and spatial equilibrium. Regional economic change, including economic accounts and other measures of activity; cycles, growth, and planned development.

AEB 6634—Agricultural Development Administration (4) Special reference to government and quasi-government units in developing countries.

AEB 6645—Economic Development and Agriculture (5) *Prereq: ECO 3251, 3100, or AEB 3103.* Relation of human, capital, and natural resources, technology, and institutions to income growth and distribution. Development planning in low-income countries.

AEB 6651—Agriculture's Role in the Growth of Latin American Nations (4) Agricultural development in relation to facts and theories of national growth, international relations, and hemispheric understanding and cooperation.

AEB 6674—International Agricultural Policy and Trade (5) *Prereq: AEB 4511, ECO 3703.* Trade theory applied to international policies, agreements, and programs.

AEB 6727—Rural Welfare and Development Policy (5) *Prereq: ECO 4205, 4101, AEB 4726 or consent of instructor.* Underdevelopment in the U.S. within a historical framework. Nature and consequences of levels of human and nonhuman investment in a dynamic setting.

AEB 6815—Science and Research Methodology (3) Role of science, philosophy, and scientific methods in food and resource economics research.
AEB 6905—Problems in Food and Resource Economics (1-6; max: 6) Individual study. Problems of interest to the student and agreeable to the instructor.
AEB 6910—Supervised Research (1-5)
AEB 6933—Special Topics (1-9; max: 9) *Prereq: consent of instructor.* Varying topics.
AEB 6940—Supervised Teaching (1-5)
AEB 6971—Research for Master's Thesis (1-15)
AEB 7980—Research for Doctoral Dissertation (1-15)

FOOD SCIENCE AND HUMAN NUTRITION
College of Agriculture

GRADUATE FACULTY 1979-80

Chairman: J. R. Kirk. *Graduate Coordinator:* R. P. Bates. *Professors:* E. M. Ahmed; H. Appledorf; R. P. Bates; J. R. Kirk; J. A. Koburger; R. F. Matthews; H. A. Moye; N. P. Thompson; S. V. Ting; W. B. Wheeler. *Associate Professors:* R. J. Braddock; J. C. Deng; A. P. Emerson; J. L. Oblinger; R. C. Robbins; R. H. Schmidt; K. L. Smith; R. L. West. *Assistant Professors:* L. B. Bailey; P. J. Crandall; T. R. Graumlich; J. F. Gregory; D. M. Janky; W. S. Otwell; P. A. Wagner. *Research Scientist:* J. S. Dinning.

The Department of Food Science and Human Nutrition offers the degrees of Master of Agriculture, Master of Science, and Doctor of Philosophy. Areas of specialization include nutrition, food chemistry, food processing and food safety.

Students may work on a problem covering more than one area of study. Research within areas of specialization includes nutritional biochemistry, nutritional status, food product development, food chemistry and analytical methodology, food quality, food microbiology, seafood technology, citrus processing, toxicology, and the metabolism, analytical methodology, and analysis of pesticide residues in plant and animal tissues. Through a cooperative program administered by the Departments of Food Science and Human Nutrition and Agricultural Engineering, a student can pursue a graduate program in food engineering. Students enrolled in food science will be granted their degrees in food science and human nutrition with an area of emphasis identified as food engineering. Students desiring an engineering degree must be admitted to a graduate program in agricultural engineering or another department within the College of Engineering. Similar cooperative research programs may be developed with other departments within the University.

Graduate students should have sufficient background in physical and biological sciences, and food science or nutrition. Students with inadequate backgrounds will be required to take prerequisite subjects without credit toward their graduate degrees. Students interested in graduate programs are invited to visit with the graduate coordinator and departmental faculty.

FOS 5561—Citrus Processing Technology (4) *Prereq: undergraduate course in food processing.* Grading, inspection, sampling, extraction and concentration of citrus products emphasizing manufacturing and quality assurance.
FOS 6226C—Advanced Food Microbiology (4) *Prereq: FOS 4222C.* Selection of media and laboratory methods, chemical and biological determinations, characterization of foodborne pathogens and spoilage organisms.
FOS 6229C—Determinative Food Microbiology (4) *Prereq: FOS 4222C or permission of instructor.* Isolation and taxonomic identification of microorganisms of importance to the food industry. Morphological, cultural, ecological and biochemical characteristics of aerobic and anaerobic pathogenic and spoilage organisms will be examined.
FOS 6315C—Advanced Food Chemistry (4) *Prereq: BCH 4313, FOS 4311C.* Functions of lipids, carbohydrates, proteins, enzymes, and other components in foods and their reactions and interactions during food processing and storage.
FOS 6316—Proteins in Food Systems (3) *Prereq: FOS 6315.* Relationships between protein structure and function in food systems. Effects of processing on the physical, chemical, and nutritional properties of food proteins.
FOS 6317—Lipids in Food Systems (3) *Prereq: FOS 6315.* A comprehensive discussion of the composition, structure, physical, and chemical properties of lipids. Requirements for processing fats and oils and their function in food systems.
FOS 6318—Carbohydrates in Food Systems (3) *Prereq: FOS 6315.* The physical and chemical properties of simple and complex carbohydrates. The effect of processing on carbohydrates and their function in food systems.
FOS 6319C—Enzymes in Food Systems (3) *Prereq: FOS 6315.* A comprehensive discussion of the parameters which affect enzyme activity. Properties of enzymes important in biological systems, and use of enzymatic techniques in food processing and nutrition research.
FOS 6355C—Instrumental Analysis and Separations (5) *Prereq: CHM 3120, FOS 4311C.* Instrumental analysis and separations of chemicals in foods; gas, high performance liquid, thin-layer, ion-exchange and molecular size chromatography; spectral characterization via UV-visible, IR, NMR and mass spectrometry.
FOS 6371C—Pesticide Analysis (4) *Prereq: CHM 2043C.* Current pesticide analytical procedures. Sampling methods, extraction, clean up, and detection of pesticides in biological organisms and environments.
FOS 6428C—Food Processing Systems (4) *Prereq: MAG 3312 and a 4000 level processing course.* Processing systems of current importance and those of future potential evaluated with emphasis on food engineering principles and the resulting biochemical, microbiological and nutritional interactions.
FOS 6429C—Food Processing Mechanics (3) *Prereq: A 4000 level processing course.* Design, installation, modification, operation and maintenance of food processing equipment and related machinery. Laboratory emphasis on processes consistent with the physical, chemical, biological and economical constraints of food systems.
FOS 6435C—Food Product Development (4) *Prereq: Eight credits in food science.* Theoretical and technological considerations of food product development.
FOS 6455C—Industrial Food Fermentations (4) *Prereq: FOS 4222C.* Microbiological, chemical, and physical principles in fermentation of foods and constituents, including single cell protein production.
FOS 6726C—Psychophysical Aspects of Foods (4) *Prereq: FOS 4311 and 4722C.* Physical and chemical stimuli controlling human sensory perception of texture, color, and flavor of foods. Methods of measurement and influence of processing methods on quality attributes of foods.
FOS 6905—Problems in Food Science and Human Nutrition (1-6; max: 12) Individual study carried out in the laboratory, library, pilot plant, or the food industry.
FOS 6910—Supervised Research (1-5)
FOS 6915—Research Planning (2) Required of all first-year graduate students. Food science and nutrition investigations, identifying problems, planning and initiating research, experimental techniques, analysis of data and reporting of results.
FOS 6936—Topics in Food Science and Human Nutrition (1-4; max: 12) Special aspects or current developments in food science and human nutrition.
FOS 6938—Food Science and Human Nutrition Seminar (1) Preparation and presentation of reports on specialized aspects of research in food science and human nutrition.
FOS 6940—Supervised Teaching (1-5)
FOS 6971—Research for Master's Thesis (1-15). Approval of department.

FOS 7980—Research for Doctoral Dissertation (1-15). Approval of department.

HUN 6191—Nutritional Status and Food Policy (2) Malnutrition in the United States and developing countries and the role of governments in its alleviation.

HUN 6245—Advanced Human Nutrition (3) *Prereq: BCH 4313 and a nutrition principles course.* Ingestion, digestion, absorption, transport, metabolism and excretion of the macronutrients; metabolic and neuroendocrine control of nutrient homeostasis.

HUN 6292—Current Topics in Human Nutrition (3) *Prereq: FOS 6641 or consent of instructor.* Critical reading of scientific literature in areas of current interest. Focus on those experimental results related to controversial areas of diet planning. Emphasis on analysis of experimental results and practical applications in a seminar format.

HUN 6301—Nutritional Aspects of Carbohydrates and Lipids (4) *Prereq: BCH 4203.* Role of carbohydrates and lipids in nutrition, with emphasis on energy metabolism.

HUN 6321—Proteins and Amino Acids in Nutrition (4) *Prereq: BCH 4203.* Nutritional aspects of proteins and amino acids, with emphasis on requirements, evaluation, and formulations of diets for various physiological functions.

HUN 6331—Vitamins and Minerals in Human Nutrition (4) *Prereq: BCH 4203.* Role of vitamins and minerals in human metabolism, metabolic and physiological responses to deficiencies and excesses bioavailability, endocrine and mineral regulation of vitamin and mineral homeostasis. Technology of vitamin and mineral fortification of foods, vitamin and mineral interactions.

HUN 6812C—Analytical Techniques in Nutrition Research: Biological and Radiochemical (4) *Prereq: CHM 3200.* Diet formulation, nutrient balance studies, tissue handling and biochemical analyses of tissues and fluids. Handling of radiochemicals for studies concerning digestions, absorption, distribution and excretion of nutrients. Use of beta and gamma counters, radio-immunoassays for hormones and total body counting.

SCHOOL OF FOREST RESOURCES AND CONSERVATION

College of Agriculture

GRADUATE FACULTY 1979-80

Director: A. C. Mace, Jr. *Graduate Coordinator:* R. A. Schmidt. *Professors:* L. G. Arvanitis; D. J. Forrester; R. E. Goddard; L. R. Grosenbaugh; R. F. Labisky; A. C. Mace, Jr.; W. L. Pritchett; R. A. Schmidt; W. H. Smith; A. E. Squillace. *Associate Professors:* R. F. Fisher; L. D. Harris; C. A. Hollis, III; J. B. Huffman; D. M. Post; J. V. Shireman; E. T. Sullivan; B. F. Swindel. *Assistant Professors:* G. M. Blakeslee; K. C. Ewel; W. R. Marion; W. H. Moore; H. Riekerk; D. L. Rockwood; W. Seaman, Jr.; G. W. Tanner.

The School offers work leading to the degree of Master of Science, with specializations in forestry, forest products technology, range ecology, and wildlife ecology (including fisheries). Programs leading to the degree of Doctor of Philosophy are offered with tracks in forest biology and wildlife ecology. A nonthesis degree, Master of Forest Resources and Conservation, is also offered in the same specializations as the Master of Science degree.

Graduate students should have appropriate undergraduate training in biological, social, and physical sciences, including physics, chemistry, and mathematics. Students with inadequate backgrounds may be required to take (without credit at the graduate level) undergraduate courses pertinent to their field of interest.

FNR 5465—Simulation of Ecological Models (3) *Prereq or coreq: COP 3110.* Design of ecological models; simulation on analog and digital computers.

FNR 6608—Research Planning for Resource Decisions (4) *Prereq: consent of instructor.* Scientific methodology employed in natural resources research, including problem analyses and the selection, planning, conduct, and presentation of results of a research project.

FNR 6905—Research Problems in Forest Resources and Conservation (3-9; max: 12)

FNR 6910—Supervised Research (1-5)

FNR 6922—Natural Resources Colloquium (1; max: 6) Discussions of principles and policies relating to natural resources biology, ecology, inventory, management, economics, and utilization, involving faculty, students, and external experts.

FNR 6933—Seminar (1; max: 3) S/U.

FNR 6934—Topics in Forest Resources and Conservation (1-5; max: 9) Selected topics in forestry, wood science, range, recreation, wildlife, and fisheries.

FNR 6940—Supervised Teaching (1-5)

FNR 6971—Research for Master's Thesis (1-15)

FNR 7980—Research for Doctoral Dissertation (1-15)

FOR 5645—Range Ecosystem Planning (5) *Prereq: FNR 3650, FOR 4624, or consent of instructor.* Application of the systems approach and analytical tools for development of practical range management plans for private landowners and public agencies, with emphasis on integrated management systems.

FOR 6167—Silviculture (4) *Prereq: FOR 4162 or consent of instructor.* A quantitative study of the influence of modern silvicultural practices on tree and stand growth and form, and a consideration of the environmental impact of silvicultural manipulations.

FOR 6170—Tropical Forestry (4) *Prereq: FOR 4162.* Forest of the tropics, climatic influences, local laws and customs affecting forestry practice, multiple-use implications, wood properties and uses in relation to forest development, forest types and management; stress on American tropics.

FOR 6310—Forest Genetics (4) *Prereq: acceptable background in genetics.* Application of principles of genetics in the silvicultural handling of forest stands; selection, hybridization, and tree-breeding techniques.

FOR 6337—Forest Pathology (5) *Prereq: PLP 3002, 3003L or FOR 3333; FOR 4162.* An intensive study of the most important forest tree diseases in USA; selection based upon impact on major regional silvicultural systems and management objectives. Laboratories emphasize field-based studies and research techniques.

FOR 6340—Physiology of Forest Trees (3) *Prereq: BOT 3503C and BCH 3023 or equivalent.* Factors influencing forest tree and stand energy balance, flowering, seed production, germination, water relations and growth; applications to forestry problems.

FOR 6453—Forest Mensuration (4) *Prereq: FNR 3421, FOR 3430, or equivalent, computer competency, and consent of instructor.* Tree and stand growth modeling. Advanced forest sampling designs. Simulation of dynamics of forest stands. Linear and nonlinear estimation of forest parameters. Forest biomass estimation.

FOR 6543—Economic Analysis of Forest Operations (4) *Prereq: FOR 4541 or equivalent.* Application of economic analysis to forest practices with particular emphasis on plantation forestry.

FOR 6625—Forest Watershed Management (3) *Prereq: FOR 4162, SOS 6233.* Forest management practices in relation to hydrologic responses and water quality considerations.

FOR 6742—Wood Preservation (4) Relationships between wood and wood-deteriorating agents, evaluation and analysis of preservatives; factors involved in treating wood; treatment and service evaluation.

FOR 6746—Wood Science (4) *Prereq: FOR 3140 or equivalent.* Microscopic structure of wood; chemical and physical properties of woody materials; tree growth in relation to wood qualities.

SOS 6233—Forest Soils (4) *Prereq: SOS 3022C, FNR 3011 or equivalent.* Soil as a component of forest ecosystems. Soil chemical, physical, and biological properties influencing forest growth; biochemical and hydrological cycles as they relate to forest land use.

WIS 5323—Impact of Diseases on Wildlife Populations (3) *Prereq: WIS 3401 or equivalent.* Diseases of wildlife, with

emphasis on their impact on avian and mammalian populations of North America.

WIS 6253—Fishery Science (4) *Prereq: WIS 4220 or equivalent, STA 6166, 6167, and approval of instructor.* Dynamics of fish populations with emphasis on population estimation, ecological influences on distribution, physiological responses to environmental stresses, and fishery management problems.

WIS 6452—Wildlife Ecology (4) *Prereq: WIS 3401 or equivalent.* Ecological relationships of wildlife populations in forest, grassland, and agricultural ecosystems, with special emphasis on population functioning.

WIS 6454—Behavioral Principles of Wildlife Management (3) *Prereq: ZOO 3513C or consent of instructor.* Behavior and social organization of game and nongame species as they pertain to population management.

WIS 6456—Wildlife Population Analysis (4) *Prereq: STA 6166, 6167, and background in ecology.* Survey of quantitative techniques used to determine abundance, density, productivity, and distribution of wildlife populations.

WIS 6524—Role of the Public in Natural Resources Management (3) *Prereq: PUR 4000 or approval of instructor.* An analysis of public involvement in policy problems related specifically to the management of renewable natural resources—wildlife, fisheries, range and forestry.

FOUNDATIONS OF EDUCATION
College of Education

GRADUATE FACULTY 1979-80

Chairman: R. R. Sherman. *Graduate Coordinator:* D. L. Avila. *Professors:* D. L. Avila; B. B. Brown; R. L. Curran; G. E. Greenwood; W. H. Guertin; M. L. Koran; J. M. Newell; A. J. Newman; R. R. Renner; R. R. Sherman; R. S. Soar; H. L. Wass. *Associate Professors:* P. Ashton; W. A. Busby; L. M. Crocker; S. B. Damico; B. J. Guinagh; R. E. Jester; R. B. Webb; A. O. White. *Assistant Professors:* J. J. Algina; S. D. Andrews; P. T. Ashton; J. K. Bengston; S. F. Olejnik.

The Department of Foundations of Education offers the Master of Education, the Master of Arts in Education (with thesis), the Specialist in Education, the Doctor of Education, and the Doctor of Philosophy degrees with specialization in psychological foundations, research foundations and social foundations of education.

Specific areas of specialization include human development, personality theory, learning theory, and general educational psychology within psychological foundations; research methodology, computer instruction, education statistics, and measurement and evaluation within the research foundations; and social, historical and philosophical foundations and comparative and international education within social foundations. Special program opportunities are available through participation in the activities and research of the Institute for the Development of Human Resources.

EDF 5215—Principles of Learning and Instructional Practice (5) Survey of principles of learning and their relationship to instructional practice. Includes topics such as transfer of training, reinforcement, forgetting, and problem solving.

EDF 5431—Measurement and Evaluation in Early Childhood (5) Basic concepts of test construction and interpretation, including norms, reliability and validity. Overview of assessment techniques and problems in assessing intelligence, language, achievement, socio-emotional and perceptual motor development in children from infancy through six years of age. Students may not receive credit for both EDF 4430 and EDF 5431.

EDF 6111L—Laboratory in Human Development I (5) Supervised field and laboratory experiences in the observation, evaluation, and educational modification of human development. Contact with children of different ages and experience with learning, measurement, evaluation, and research.

EDF 6112L—Laboratory in Human Development II (5) *Prereq: EDF 6403.*

EDF 6113—Educational Psychology: Human Development (5) Current research and theories in the area of human development.

EDF 6118—Educational Psychology: Aging and Education (5) Psychological and social processes in aging; education for aging and rehabilitation.

EDF 6119—Educational Psychology: Death Education (4) Attitudes toward death, dying process, funeral practices, and grieving. Role of education for better understanding and coping with death.

EDF 6211—Educational Psychology: General (5) Not open to students majoring in psychology or psychological foundations of education. Basic principles, techniques, and research in educational psychology; designed for graduate students preparing to teach who have a minimal background in psychology.

EDF 6215—Educational Psychology: Learning Theory (5) *Prereq: consent of instructor.* Logic and methodologies of theories of learning.

EDF 6218—Educational Psychology: Problems (5) Individualized study of problems dealing with child development, adolescence, learning, and other areas of educational psychology.

EDF 6355—Educational Psychology: Personality Dynamics (5) Dynamics of behavior and their implications for education, counseling and guidance, administration, family relationships, and social action.

EDF 6401—Educational Statistics (4) *Prereq: STA 3013 or 3023.* Statistical methods as applied to educational data and problems.

EDF 6403—Quantitative Foundations of Educational Research (10) *Prereq: STA 3013, 3023, or equivalent.* Integrated coverage of fundamentals in the general field of education research. Includes statistics, experimental design, and data processing.

EDF 6436—Theory of Measurement (5) *Prereq: STA 3013 or 3023; EDF 4430.* Introductory study of true score models, reliability, validity, norms, scaling, item analysis, and basic elements of instrument selection.

EDF 6481—Research Methods in Education (5) *Prereq: STA 3013 or 3023 or EDF 4430.* Research methods applicable to classroom practices. Cannot be used to meet the research preparation requirement for the Ed.D. degree.

EDF 6487—Assessment of Classroom Behavior (4) Instruction in at least four systems for measuring teacher-pupil behavior, representing the social-emotional and cognitive domains. Observation practiced in classrooms as well as with audio and video tape and film.

EDF 6520—History of Education (5) Salient issues in education from the Reformation to the present.

EDF 6525—Ancient and Medieval Education (5) Pedagogical practice and thought in China, India, Semitic nations, Greece, Rome, Islam, and Medieval and Renaissance Europe.

EDF 6544—Philosophical Foundations of Education (5) Philosophical bases for democracy and education.

EDF 6606—Socioeconomic Foundations of Education (5) Survey of the socioeconomic foundations of education.

EDF 6630—Educational Sociology (5) Educational experiments with the social variables of decision-making systems, task, curriculum, group size, and group social composition.

EDF 6712—Comparative Education (5) Relationships of school and society in different cultural areas of the world.

EDF 6720—Education in Latin America (5) Traditions and contemporary social, political, and cultural aspects.

EDF 6905—Individual Study (1-5; max: 15) For advanced students who wish to study individual problems in psychological, social, or philosophical foundations of education, or research or measurement under faculty guidance.

EDF 6910—Supervised Research (1-5)

EDF 6933—Seminar on Research on Effective Teaching (4) Systematic observation as a frame of reference for recording, analyzing, and conceptualizing teaching; research results; implications for teaching and learning.

EDF 6938—Special Topics (2-5; max: 15) *Prereq: consent of department chairman.*

EDF 6940—Supervised Teaching (1-5)
EDF 6941—Practicum in Educational Research (3-12; max: 12) *Prereq: EDF 6403. Arrangements must be made with instructor prior to registration.* Experience in conducting various phases of quantitative educational research under individual supervision.
EDF 6943—Practicum in Educational Psychology (5; max: 15) *Prereq: consent of instructor.* Supervised experience in a practical work situation dealing with problems and issues appropriate to psychological foundations and their resolution.
EDF 6971—Research for Master's Thesis (1-15)
EDF 7117—Affective Development and Education (5) *Prereq: EDF 6113 or equivalent.* Application of theory and research in affective development to the educational context.
EDF 7146—Educational Psychology: Cognition in the Educative Process (5) *Prereq: EDF 6113.* Cognitive development as applied to curriculum development and teaching procedures.
EDF 7149—Educational Implications of Perceptual Psychology (5) Research literature on human behavior and its implications for educational theory and practice.
EDF 7198—Advanced Educational Psychology: Seminar in Aging and Education (5) *Prereq: EDF 6118 or consent of instructor.* Research literature on aging process; implications for educational planning; critical examination of existing programs.
EDF 7229—Advanced Educational Psychology: Learning (5; max: 15) *Prereq: EDF 6215.* Educational implications of contemporary approaches to learning. Relationship between topics in learning and their implication for instructional practices.
EDF 7405—Advanced Quantitative Foundations of Educational Research (5; max: 10) *Prereq: EDF 6403.* Integrated coverage, through team-teaching, of important approaches to educational research. Includes advanced statistics, design, computer applications, and analysis of selected research.
EDF 7432—Advanced Psychometric Theory (5) *Prereq: EDF 6436 or equivalent.* Study of theoretical problems related to test construction. Topics include current developments in reliability and validity estimation; alternate true-score models; item analysis and scoring techniques, scaling, assessing latent traits, and methods for psychometric research.
EDF 7486—Methods of Educational Research (4) *Primarily for Ed.D. candidates. Prereq: STA 3013 or 3023.* Examination of research methodologies. Problem identification as well as organization and presentation of data.
EDF 7491—Evaluation of Educational Products and Systems (5) *Prereq: EDF 4430 and at least one course in statistics or research methods.* Models and methods for formative and summative evaluation of educational products and programs.
EDF 7555—Education and Moral Spiritual Ideas (5) Moral ideas, the relation of moral values to school subjects, and the question of direction and systematic moral and spiritual instruction in the schools.
EDF 7573—Contemporary Education Theories (5) Seminar for post master's students. Contemporary philosophical theories of education.
EDF 7575—Theories of Mind (5) Mind and thinking process, with implications for curriculum organization and classroom practice.
EDF 7584—Educational Classics (5; max: 10) Historical and philosophical examination of enduring writings on education from ancient to modern times.
EDF 7608—School and Society (5) *Open to students admitted to the Advanced School.* Provides a social and philosophic frame of reference for the society in which education occurs and its implications for the functioning of the school.
EDF 7639—Research in Educational Sociology (5)
EDF 7931—Seminar in Educational Research (4) *Prereq: EDF 6403. Coreq: EDF 7405.* Educational researches to develop appreciation of the investigations and understanding of the methodological techniques employed.
EDF 7932—Analysis of Educational Research (4) *Prereq: EDF 6403, 7405. Coreq: EDF 7931.* Educational researches to develop appreciation of important methodological techniques and newer approaches in educational research.
EDF 7934—Seminar in Educational Foundations (5; max: 15) Historical, philosophical, social, psychological, aesthetic, and comparative foundations of education.
EDF 7980—Research for Doctoral Dissertation (1-15)
SPS 7949—Internship in School Psychology (5)

GENERAL TEACHER EDUCATION
College of Education

GRADUATE FACULTY 1979-80

Chairman & Graduate Coordinator: R. B. Myers. *Professors:* R. B. Myers; L. C. Oberlin. *Associate Professors:* R. A. Blume; P. S. George; S. O. Johnson; S. M. Kinzer; A. E. Morgan; A. B. Packer; J. J. Shea. *Assistant Professors:* L. L. Lamme; G. M. Schuncke.

The department offers programs leading to the Master of Education (nonthesis), Master of Arts in Education (thesis), and Specialist in Education degrees with specialization in the following areas: early childhood education, elementary education, and middle school education. The department also offers programs leading to the Doctor of Education and Doctor of Philosophy degrees with specializations in early childhood education and elementary education.

For subject area courses, see the Department of Subject Specialization Teacher Education. For general curriculum and instruction courses at the advanced level, see the Department of Instructional Leadership and Support.

General Courses
EDE 6525—Classroom Discipline: Applying Alternative Methods (4) Examining the issues of discipline and management in the schools. Emphasis on increasing the classroom teacher's ability to apply alternative strategies for effective discipline.
EDE 6541—Individualization of Instruction (4) School patterns as determiners of educational programs in childhood education. Innovative approaches in nursery, kindergarten, elementary, and middle schools.
EDE 6905—Individual Work (2-5; max: 15) For advanced students who wish to study individual problems in childhood education and/or early childhood education under faculty guidance.
EDE 6910—Supervised Research (1-5)
EDE 6932—Special Topics (2-5; max: 15) *Prereq: permission of department chairman.*
EDE 6940—Supervised Teaching (1-5)
EDG 6426—Planning and Implementing Programs for Utilizing Aides, Volunteers, and Tutors (4) The professionals role in programs to recruit, plan for, train, supervise, and evaluate paraprofessionals.
EDG 6436—Parent Education for Educators (4) Review of roles of parents and children in the family; planning and conducting parent education units for children and parents.
EDG 6712—The Education of Culturally Disadvantaged Children and Youth (4) Curriculum content and procedures pertinent to educational needs.
EDG 6941—Field Laboratory for Faculty Study of Special Problems (3-9; max: 9) Offered only by extension. To assist teachers in single schools, groups of schools, or county systems in improving certain subject areas or in working on special problems within the system.
EDG 6971—Research for Master's Thesis (1-15)
EDG 7795—Seminar in the Education of Disadvantaged Children and Youth (4) Open to advanced graduate students. Research and literature dealing with developing programs for culturally disadvantaged children and youth.
EDG 7980—Research for Doctoral Dissertation (1-15)
EDS 6351—Supervision of Pre-Service Teachers (2-5; max: 5) Open to graduate students with certification and background in childhood education.

ESE 6385—Supervision of Pre-Service Teachers (2-5; max: 5) Functions of the directing teacher in the program, including problems and procedures of supervising the work of pre-service teachers.

Early Childhood Education

EEC 5945—Laboratory in Nursery-Kindergarten Teaching I (4) *Prereq or coreq: EDF 3122 or consent of instructor and teaching experience.*

EEC 5946—Laboratory in Nursery-Kindergarten Teaching II (4) *Prereq or coreq: EEC 5945 and EDF 3122, or consent of instructor and teaching experience.*

EEC 6051—Early Childhood Education I (4) Trends in the teaching of nursery and kindergarten children as shown in past and current educational theory.

EEC 6205—Early Childhood Education II (4) Current organization patterns and program models affecting nursery and kindergarten curriculum.

EEC 6307—Parent Education Programs (4) *Prereq: EDF 6113 or equivalent.* Strategies professionals can use to design programs for involving parents of their children in home, school, and community programs.

EEC 6405—Resources for Early Childhood Education (4; max: 8) *Prereq: matriculation in an early childhood education graduate program.* Laboratory experiences in an array of community and institutional agencies.

EEC 6522—Day Care for Young Children (4) The background, curriculum, organization, staffing, training of staff, parent education and involvement, funding and research of day care.

EEC 6946—Practicum in Early Childhood Education (2-8; max: 16) Supervised experience in a variety of early childhood settings with weekly seminars.

EEC 6947—Practicum in Parent Education (2-8; max: 16) Supervised experience in a variety of parent education program settings with weekly seminars.

EEC 7932—Seminar in Early Childhood Education (2-8; max: 8) *Open to advanced graduate students.* Problems and issues.

Elementary Education

EDE 6205—Elementary School Curriculum (4) *Prereq: EDG 6250 or a course in curriculum.* Content and methods. Primarily for students with no course background or teaching experience in elementary curriculum.

EDE 6225—Practices in Childhood Education (4) *Prereq: course background or teaching experience in the elementary curriculum.* Elementary school practices in relation to fundamental principles of curriculum development; selection, organization, and development of effective teaching-learning situations.

EDE 6948—Practicum of Elementary Education (4-8; max: 16) *Prereq: consent of the instructor.*

EDE 7247—Problems in Childhood Education I (4) Advanced course in elementary school curriculum.

EDE 7248—Problems in Childhood Education II (4)

EDE 7415—Evaluation in the Elementary School (4) Point of view, methods, and techniques used in appraising behavioral growth of pupils; evaluation of the objectives of the total program.

EDE 7935—Seminar in Elementary Education (4-8; max; 8) *Open to advanced graduate students.* Current research and an overview of the total program.

The following specialized subject area courses may be necessary to fulfill requirements in General Teacher Education program areas.

ARE 5313—Teaching Art in the Elementary School (4) *For in-service teachers. Not open to students who have taken ARE 3312.* Study of art expression based on an understanding of child development. Laboratory, lecture, visual aids, class discussion, and individual projects.

ARE 5315—Teaching Art in Elementary School II (4) *For in-service teachers. Prereq: ARE 5313 or 3312 or equivalent.* Laboratory experiences with materials. Emphasis upon ways of developing art experience with children. Individual and group projects.

LAE 6301—Early Childhood Language Arts and Reading (4) *Prereq: RED 5310/LAE 6319.* Factors influencing early language and their relationship to beginning school programs in listening, speaking, reading, and writing.

LAE 6319—Language Arts in the Elementary School (4) Speaking, listening, writing, and language study in the elementary classroom.

LAE 6714—Children's Literature in the Childhood Curriculum (4) *Prereq: ENG 4161.* Evaluating, selecting, and using fiction, biography, poetry, and informational books for instructional, informational, and recreational purposes.

MAE 5318—Teaching Modern Math in Elementary School (4) Analysis of content, methodology, and materials for teaching modern mathematics.

MAE 6115—Mathematics in the Elementary School (4) *Prereq: MAE 5318.* Recent research, patterns of curriculum, techniques of teaching, and use of instructional media. Primarily for elementary teachers who desire specialization in mathematics education.

RED 5310—Reading in the Primary Grades (4) Basic course for teaching reading, with emphasis on materials and methods for use with young children at prereading and beginning reading levels.

RED 5355—Reading in the Intermediate Grades (4) Basic course, with emphasis on materials and methods for teaching reading to students in upper elementary grades, middle, and junior high schools.

SCE 5115—Teaching Science in Elementary School (4) Basic course for in-service teachers. Emphasis on science content, methods, and materials for elementary school children.

SCE 6117—Science Education in the Elementary School (4) Current problems, new materials and teaching techniques, research and recent development in the sciences.

SSE 6117—Social Studies Education—Elementary School (4) *Prereq: graduate curriculum course.* Contributions of social education to the total elementary school program, with emphasis on social interaction and programs and procedures in social studies area.

Middle School Education

EDM 6005—The Emergent Middle School (4) Program, organization, and rationale of the newly emerging middle school in American school districts.

EDM 6945—Practicum in Middle School Education (4, max: 12) *Prereq: eligibility for regular rank III certificate in elementary, middle or secondary school teaching; 27 credits in English language arts, mathematics, science, or social studies; course in the teaching of reading; EDM 6005 (may be co-requisite).*

EDM 7935—Seminar in Middle School Education (1-4; max: 4) *Open to students in Advanced School. Prereq: approval of instructor.* Theory, research and practices in education, program development, in-service teacher training, and instruction strategies.

Secondary Education

ESE 6215—The Secondary School Curriculum (4) Scope, function, and types of secondary school curricula and ways of improving existing programs.

ESE 6235—Curriculum Development Laboratory (2-5; max: 15) Guided experiences in developing resource units for teaching and in writing courses of study.

ESE 6920—Secondary Education Lectures Series (1; max: 3) Current problems and issues presented by departmental faculty and visiting educators.

ESE 7922—Secondary Education Colloquium (1; max: 6) Topics presented by departmental faculty, students, and visiting educators. S/U.

ESE 7935—Seminar in Secondary Education (2-5; max: 15) *Open to advanced graduate students only upon consent of the staff of secondary education.* Current research and an overview of the total program in secondary education.

GEOGRAPHY
College of Liberal Arts and Sciences

GRADUATE FACULTY 1979-80

Chairman: R. B. Marcus. *Graduate Coordinator:* C. W. Spurlock. *Professors:* G. A. Antonini; R. E. Crist *(Emer-*

itus); C. I. Cross; J. R. Dunkle; J. P. Latham;† R. B. Marcus; H. McConnell;* S. McCune *(Emeritus);* D. L. Niddrie; D. J. Patton;* L. R. Peterson; E. C. Pirkle; H. L. Popenoe; R. J. Tata;† B. G. Vanderhill.* *Associate Professors:* H. J. Armstrong; A. K. Craig;† D. Dyerson;* E. A. Fernald;* A. J. Lamme; D. R. Lee;† C. N. Olsson; L. A. Paganini; C. W. Spurlock; M. D. Winsberg.* *Assistant Professors:* E. F. Abbott; V. R. Hetrick; R. R. Schultz.†

These members of the faculty of The Florida State University (*) and Florida Atlantic University (†) are also members of the graduate faculty of the University of Florida and participate in the doctoral degree program in the University of Florida Department of Geography.

The Department of Geography offers work for the following graduate degrees: Master of Arts or Master of Science (thesis); Master of Arts in Teaching or Master of Science in Teaching (nonthesis but with required teaching experience); Doctor of Philosophy. A graduate student should have an undergraduate major in geography or in the social sciences with emphasis on geography. Deficiencies in undergraduate work in geography can be corrected concurrently with registration in graduate level courses.

The department provides general work in geography at the master's level but specializes at the doctoral level in economic geography, particularly agricultural and urban geography, and in the regional geography of the Latin America. The department maintains close ties with interdepartmental programs in tropical agriculture, urban studies, Latin American studies and African studies; certificates in certain of these fields may be obtained in addition to graduate degrees in geography.

Study for the Ph.D. degree in geography at the University of Florida by qualified master's degree recipients at FSU and at FAU is facilitated by a cooperative arrangement in which appropriate members of these two universitites are members of the graduate faculty of the University of Florida.

GEA 6109—Tropical Lands and Their Utilization (12) *Prereq: GEO 4124.* Field course emphasizing analytic inquiries into land use systems in Costa Rica. Special topics on land utilization types and environmental influences, settlement and field patterns, the market factor, labor supply, and transportation. Given in Costa Rica as part of the program of the Organization for Tropical Studies.

GEA 6179—Seminar: Developing Nations (4; max: 16) *Prereq: consent of instructor.* Selected problems in geography of developing nations.

GEA 6219—Seminar: United States and Canada (5) Geography of the United States and Canada, with emphasis on topics selected by instructor.

GEA 6309—Seminar: Middle America and the Caribbean (5) Cultural, economic, political, and resource characteristics and developement of representative areas.

GEA 6419—Seminar South America (5) Cultural, economic, political, and resource characteristics and development of representative areas.

GEA 6468L—Resource Utilization and Conservation in Latino America (4) Regional appraisal of human and natural resources. Analysis of the role of resource utilization and conservation in the development of Latin American countries.

GEA 6469—Seminar: Land, Man, and Migration in Latin America (4) Physical and cultural factors in population movements in Latin America, particularly from cold highlands to hot lowlands, and from rural sectors to metropolitan areas.

GEO 5105C—Advanced Cartography (3) *Prereq: GEO 4100; COP 3110, 4215 or consent of instructor.* Advanced methods of cartography, including computer cartography and elements of cartographic reproduction.

GEO 5125C—Advanced Air Photo Interpretation (3) *Prereq: GEO 3200 or consent of instructor.* Uses of aerial photographs in geographical research.

GEO 5145C—Remote Sensing (3) *Prereq: GEO 4124.* Uses of remote sensing imagery in geographical research.

GEO 5166C—Advanced Quantitative Analysis in Geography (3) *Prereq: GEO 4164; STA 6166 or equivalent.* Use of advanced quantitative techniques with geographic applications; development of research methods integrating quantitative analysis.

GEO 5437C—Research Methods in Population Geography (4) Most frequently used research methods.

GEO 5567—Industrial Location (4) *Prereq: GEO 3502 or consent of instructor.* Emphasis on location theory and its practical applications.

GEO 5605—Advanced Urban Geography (4) Empirical and theoretical spatial analysis of the various economic demographic, and social facets within and between urban settlements.

GEO 5704—Transportation Geography (4) *Prereq: GEO 2500, 3502, or consent of instructor.* Introduction to and assessment of current methods of describing, analyzing, and explaining spatial patterns of transport phenomena.

GEO 5809—Geography of World Agriculture (5) World distribution of crops and livestock in relation to natural and cultural conditions; discussion of problems of agriculture in terms of products, economic organization, and agricultural regions; significance of world affairs.

GEO 5839—Land Tenure and Rural Settlement (5) Advanced study of systems of land tenure throughout the world, with special attention to geographical factors underlying their development.

GEO 5905—Individual Study: Directed Readings (4; max: 16)

GEO 5930—Selected Topics in Geography (1-6; max: 16) *Prereq: graduate standing.* May be repeated with change of content.

GEO 5945C—Field Course in Geography (3) Methods of geographical field work. Observation, classification, interpretation, note-taking, traversing, and mapping of data. Areal analysis; land forms, climate, vegetation, soils, resources, settlement patterns, and land use.

GEO 6058—History of Geograhical Thought (5) Development of knowledge illustrated by writings of representative geographers.

GEO 6118C—Introduction to Geographical Research (5) *Prereq: admission to graduate program in geography.* Geography as a science; problem formulation; research methods and design in geography.

GEO 6356—Seminar: Land and Water Utilization (5; max: 15) *Prereq: consent of instructor.* Selected problems in utilization of land and water resources.

GEO 6429—Seminar: Cultural Geography (5) Cultural problems pertaining to American social geography and to the impact of Western Culture on aboriginal settlements.

GEO 6435—Seminar in Population (5) Combination lecture and seminar dealing with social and population problems from a spatial perspective. Major research project required.

GEO 6509—Seminar: Economic Geography (4; max: 16) *Prereq: consent of instructor.* Selected problems in geography of economic activity.

GEO 6905—Individual Work (1-5; max: 15)

GEO 6910—Supervised Research (1-5)

GEO 6938—Selected Topics in Geography (1-6; max: 16) *Prereq: Graduate standing in geography or a related field.* May be repeated with change of content.

GEO 6940—Supervised Teaching (1-5)

GEO 6946—Individual Field Work (3)

GEO 6971—Research for Master's Thesis (1-15)

GEO 7980—Research for Doctoral Dissertation (1-15)

GEOLOGY
College of Liberal Arts and Sciences

GRADUATE FACULTY 1979-80

Chairman: J. L. Eades. *Graduate Coordinator:* F. N. Blanchard. *Graduate Research Professor:* E. S. Deevey, Jr. *Professors:* F. N. Blanchard; G. M. Griffin, Jr.; E. C. Pirkle, Jr.; A. F. Randazzo; F. M. Wahl; S. D. Webb. *Associate Professors:* J. L. Eades; R. W. Pierce, Jr.; P. A.

Mueller; D. L. Smith; D. P. Spangler. *Assistant Professor: B. J. MacFadden.*

The Department of Geology offers programs leading to the Master of Science degree (thesis) and the Master of Science in Teaching (nonthesis). Areas of specialization include engineering geology, environmental geology, geochemistry, geomorphology, geophysics, industrial mineralogy, marine geology, mineralogy-petrology, paleontology-stratigraphy, petroleum geology, sedimentary petrology, and sedimentology.

For admission to graduate status in the Department of Geology a student must have a baccalaureate degree with a major in geology or a related field. A course in field methods or a summer field course is required. Deficiencies in undergraduate work in geology can be corrected by completing the undergraduate courses without credit while enrolled as a graduate student. Applicants for a master's program in geology are advised to complete courses in the areas of physical geology, historical geology, crystallography, mineralogy, elementary petrology, principles of stratigraphy, invertebrate paleontology, and structural geology. In addition, students are advised to complete courses in supportive sciences, such as mathematics, physics, chemistry, statistics, and biology. Forty-five total quarter hours will be required for the Master of Science in geology, of which at least seven courses, totaling at least 28 hours, must be in *organized* geology courses (excluding research, teaching, special projects, etc.) A maximum of nine hours of thesis research credit will be allowed. The remaining eight hours can be either in additional geology hours (excluding research, teaching, and special projects) or in a *declared* minor in another field.

During graduate residence, each student is required to take the Graduate Record Examination advanced test in geology and score higher than the 50th percentile. The score of this comprehensive examination must be reported to the candidate's supervisory committee before the final examination can be scheduled.

GLY 5050—Development of the Geological Sciences (3) History of the development of human knowledge in the "Earth Sciences" from the early Grecian writers to the birth of modern geology.

GLY 5221—Optical Crystallography (4) *Prereq: GLY 4210 or permission of instructor.* Theory of crystal optics and the application of the polarizing microscope to optical properties of nonopaque substances.

GLY 5230—Mineralogical Analysis by X-Ray Methods (4) *Prereq: GLY 4210 or permission of instructor.* Theory and practice of x-ray diffraction and emission, with emphasis on identification of crystalline materials.

GLY 5241—Geochemistry (4) *Prereq: GLY 2100 and CHM 2047.* The abundance and terrestrial distribution of the elements and their behavior during various geological processes.

GLY 5450—Introduction to Geophysics (4) *Prereq: GLY 2015 or 2991 and one year of college physics or permission of instructor.* Physics of the earth. Study of gravity and magnetic fields, seismic waves, thermal history, size and shape.

GLY 5555—Sedimentology (4) *Prereq: GLY 4301.* Analytical methods and geological interpretation of clastic sediments.

GLY 5640—Vertebrate Paleontology (4) *Prereq: ZOO 3703 or GLY 2100.* Evolutionary history of major vertebrate groups, with emphasis on principles of prehistoric investigation.

GLY 5704—Geomorphology (4) *Prereq: GLY 4400.* Application of the principles of geomorphology to the origin and evolution of landscapes.

GLY 5734—Marine Geology (4) *Prereq: GLY 2100 or permission of instructor.* Principles and methods of submarine geology, with special reference to the submerged margins of the continents.

GLY 5820—Ground Water Geology (4) Principles of ground water geology, with special reference to the Coastal Plain and Florida.

GLY 5860—Principles of Exploration Geophysics I (4) *Prereq: GLY 2015 or 2991 and one year of college physics or permission of instructor.* Reflection and refraction seismology; theory, interpretation, instruments.

GLY 5861—Principles of Exploration Geophysics II (4) *Prereq: GLY 2015 or 2991 and one year of college physics or permission of instructor.* Gravitation, magnetic, and electrical methods of exploration; instrumentation, surveying techniques, data reduction, interpretation.

GLY 6225—Petrographic Mineralogy (4) *Prereq: GLY 5221.* Application of optical crystallography to the study and identification of rock-forming minerals in thin section, including an introduction to petrography.

GLY 6245—Analytical Geochemistry (4) *Prereq: general inorganic chemistry, calculus, and geochemistry or their equivalent and permission of instructor.* Fundamentals of chemical analysis of geologic materials and training in common geochemical instrumental analytical methods.

GLY 6246—Metamorphic Geochemistry (4) *Prereq: GLY 4301 and 5241.* The origin and development of metamorphic rocks and their environments.

GLY 6247—Igneous Geochemistry (4) *Prereq: GLY 4301 and 5241.* The origin of igneous rocks as determined primarily by their chemical and mineralogic composition.

GLY 6250—Mineralogy of Clays (4) *Prereq: GLY 5221.* Structure, composition, properties, origin, and mode of occurrence of the clay minerals.

GLY 6265—Isotope Geology (4) *Prereq: general inorganic chemistry, calculus, and geochemistry or their equivalent, and permission of instructor.* Isotopes, stable and unstable, and discussion of geochronologic and tracer studies.

GLY 6341—Sedimentary Petrology (4) *Prereq: GLY 5555 or permission of instructor.* Origin, composition, and structures of sedimentary rocks, including tectonic, paleogeographic, and environmental interpretation.

GLY 6345—Sedimentary Petrography (4) *Prereq: GLY 5221.* Sedimentary rocks in thin section, with emphasis on their genesis as determined from mineral composition, texture, and occurrence.

GLY 6351—Carbonate Sedimentology (4) *Prereq: GLY 5221.* Limestones and dolostones, their origin, occurrence, and significance; study of recent and ancient carbonate depositional regimes.

GLY 6420—Tectonics (4) *Prereq: GLY 4400.* Interrelationships of orogenic belts and plate tectonic theory of the crust and upper mantle.

GLY 6530—Cenozoic Stratigraphy (4) *Prereq: GLY 4400 and 4511.* Structural elements, paleogeography, stratigraphy, and economic resources of the Gulf of Mexico coastal plain.

GLY 6574—Fluvial, Deltaic, and Transitional Environments of Sedimentation (4) *Prereq: OCE 4005; GLY 5555 or 6341.* Environmental factors and sediment types accumulated in fluvial, deltaic, and other transitional environments; recognition of these environments in ancient rocks.

GLY 6575—Coastal and Estuarine Geology (4) *Prereq: GLY 5734, 5555, or OCP 6165.* Origin and distribution of coastal and estuarine earth materials, evolution of morphological features and the dynamic changes that occur because of the interplay between terrestrial, marine, and atmospheric processes.

GLY 6615—Advanced Invertebrate Paleontology (4) *Prereq: GLY 4610.* Local field problems in paleoecology or biostratigraphy.

GLY 6620—Micropaleontology (4) *Prereq: GLY 4610.* Classification and identification of biostratigraphically important microfossil groups and their use in local and regional correlation.

GLY 6645—Ancient Vertebrate Faunas (4) *Prereq: GLY 5640 or ZOO 5115.* Evolution, distribution, and extinction of vertebrate faunas, with emphasis on problems in paleoecology, paleogeography, and patterns of phylogeny.

GLY 6651—Seminar in Evolution (4) Processes, mechanisms, patterns, and orientation of evolution.

GLY 6660—Paleoecology (4) *Prereq: GLY 4610 or ZOO 3203.* Paleoautecology, paleosynecology, historical biogeography of marine invertebrates, and ecological rules as applied to fossil invertebrates.
GLY 6705—Geomorphology of Southeastern United States (4) *Prereq: GLY 5704.* Geomorphology of the Atlantic and Gulf Coastal Plain, including the Mississippi Flood Plain and Delta, the Piedmont, Crystalline, and Folded Appalachians, and southern part of the Appalachian Plateau and adjacent areas.
GLY 6813—Non-Metallic Geologic Materials (4) *Prereq: GLY 4200.* The geologic occurrences, properties, and uses of limestone, shales and other non-metallic deposits.
GLY 6829—Hydrogeology (4) *Prereq: GLY 5820.* Principles and concepts of ground water flow systems; techniques of flow system delineation; hydrogeologic problems common to water development.
GLY 6841—Offshore Oil, Gas, and Other Mineral Resources (4) Hydrocarbon and mineral resources of the offshore area.
GLY 6896—Seminar on Mineral Deposits and Conservation Geology (4) Study of exploration of mineral resources and environmental problems associated with their utilization.
GLY 6905—Individual Work (1-5; max: 15) For work beyond that offered in regular courses.
GLY 6910—Supervised Research (1-5; max: 5)
GLY 6931—Seminar (1; max: 3) Reading in special topics.
GLY 6932—Special Topics in Geology (1-4; max: 12) Lectures, conferences, or laboratory sessions covering selected topics of current interest in modern geology.
GLY 6940—Supervised Teaching (1-5; max: 5)
GLY 6971—Research for Master's Thesis (1-15)
OCG 6276—Geological Oceanography (4) *Prereq: OCE 4005 or GLY 5734, and GLY 5555.* Structural development, sedimentation processes, and sediments of continental slope, rise abyssal plain, and associated deep-sea environments.
ZOO 6126—Historical Ecology of the Pleistocene (4) Pleistocene environments and ecosystems with emphasis on worldwide chronology and correlation, and intermediate-term historical processes that require 10^2 to 10^4 years for significant expression.

GERMANIC AND SLAVIC LANGUAGES AND LITERATURES
College of Liberal Arts and Sciences

GRADUATE FACULTY 1979-80
Chairman & Graduate Coordinator: O. W. Johnston. *Professor:* C. J. Gellinek. *Associate Professors:* O. W. Johnston; W. J. Sullivan, III. *Assistant Professors:* E. C. Barksdale; L. P. Johnson; D. M. Popp.

The department offers programs of study leading to M.A. and M.A.T. degrees in German. Areas of specialization are German literature and Germanic philology and medieval literature. In addition, sufficient courses are available for a graduate minor in Russian. The graduate program is designed to prepare students for careers in teaching, business, research, journalism, and diplomacy.

The prerequisite for admission to graduate work is an undergraduate major in the field, including advanced courses in both literature and language. Qualified candidates with B.A. degrees in other disciplines will be considered. A good foundation in a second non-Germanic language is desirable.

GER 6050—Beginning German for Graduate Students I (4) For graduate students with no formal preparation who need to acquire a reading knowledge. S/U.
GER 6051—Beginning German for Graduate Students II (4) *Prereq: GER 6050 or the equivalent.* For graduate students working to acquire proficiency in reading. S/U option.
GER 6405—Advanced Speaking and Writing Exercises (4) Practice in structure and style of oral and written German.
GER 6841—The Bible in Gothic (5)
GER 6845—The Evolution of the German Language (4) Historical survey of the German language as a mirror of the cultural forces that shaped its development.
GER 6940—Supervised Teaching (1-5; max: 5)
GEW 6305—Studies in German Drama and Theatre (4) Main tendencies in the development of German drama during different literary periods. Study of dramatic theory and analysis of masterpieces. Set against the social and political background as interpreted by the playwrights.
GEW 6335—Studies in German Poetry (4) Extensive and intensive reading and interpretation of German lyrical poetry through the ages. Different styles and themes examined and analyzed.
GEW 6401—Middle High German Love Poetry (4) *Prereq: GEW 4400, 6405, or equivalent.* Major works of Hartmann von Aue, Gottfried von Strassburg, Wolfram von Eschenbach, and Walther von der Vogelweide.
GEW 6405—Introduction to Middle High German Literature (4)
GEW 6425—Fate, Fortune, and Frivolity (5) Survey of 17th-century Baroque poetry, drama, and novel, with intensive reading and analysis of major works.
GEW 6480—Kafka, Hesse, Brecht, and Grass (4) Major trends and techniques in modern German writing. Close analysis of representative works as well as the historical and social background.
GEW 6488—Post-War Literature: East and West (5) Development and trends in poetry, the novel, and the theatre after World War II in the Federal Republic of Germany, the German Democratic Republic, Austria, and Switzerland.
GEW 6517—18th-Century German Literature (4) Major themes, forms, and techniques in the literature of the Enlightenment or "Strum und Drang" and its development in relation to the cultural, moral, and political problems of the times.
GEW 6535—Studies in German Classical Literature (4) Major literary achievements of the Weimar classic examined and interpreted. Readings include Goethe, Schiller, Hölderlin, and Kleist.
GEW 6545—Studies in Romantic or Post-Romantic Literature (4) Analysis of the uniquely German aspect of the Romantic movement in Europe. Major works of the German Romantics or "Junges Deutschland" examined in terms of themes, style, and common goals.
GEW 6558—18th-Century German Literature (4) Lasting contributions of the great German poets and writers of the period, with reference to the prevailing social and historical conditions.
GEW 6600—The Genius of Goethe (5) Selected works of Goethe in the context of the artistic, social, and political conditions of his time.
GEW 6755—The Contribution of Women in German Literary History (4) A variable content course focusing on the figure of women in German literature, German female writers, and German female critics.
GEW 6825—Foundations of German Literary Criticism (5; max: 15)
GEW 6900—Special Study in Germanic Languages and Literatures (5; max: 15) Intensive study of a selected topic.
GEW 6905—Independent Studies (2-5; max: 16) *Available only by special arrangement.*
GEW 6910—Supervised Research (1-5)
GEW 6938—Seminar in Germanic Studies (5; max: 15) *Required of all candidates for a master's degree in German.* Methodology and research problems.
GEW 6971—Research for Master's Thesis (1-15)
ICW 6400—The Viking Sagas (4)
ICW 6401—Readings in Sagas and Scaldic Poetry (4)
RUS 5301—Grammar and Composition Exercises (4) Advanced work in the grammar of the clause, and practice in composition based on Russian readings.
RUS 5701—Structure of the Russian Language (4) Linguistic studies of the grammar of Russian.
RUS 5845—The Development of the Russian Language (4) Phonological and morphological changes in the Russian language from late Indo-European times to the present.
RUW 5120—Survey of Russian Literary History I (5) Tolstoy, Dostoevsky, and other major pre-twentieth-century figures studied in the context of Russian intellectual currents and the history of European literature.

RUW 5121—Survey of Modern Russian Literature II (5) Soviet literature and the schools of the pre-Revolutionary literary milieu.
RUW 5905—Independent Studies (1-4) *Available only by special arrangement.*

CENTER FOR GERONTOLOGICAL STUDIES
Office of Academic Affairs

GRADUATE FACULTY 1979-80
Director: C. C. Osterbind. *Associate Director:* H. M. Stahmer. *Graduate Research Professor:* G. F. Streib. *Professors:* F. M. Berardo; J. W. Brookbank; C. C. Osterbind; H. C. Riker; L. G. Shaw; H. M. Stahmer; O. von Mering; H. L. Wass. *Associate Professors:* W. R. Cunningham; J. T. Giesel; J. M. McRae. *Assistant Professors:* J. C. Henretta; L. Lieberman.

The Center for Gerontological Studies (1) offers the Graduate Certificate in Gerontology for master's and doctoral students in conjunction with graduate programs in several disciplines and (2) affords graduate students with backgrounds in different disciplines the opportunity to concentrate in gerontology through training that incorporates multidisciplinary instruction, field experience, and research activity. Financial support for graduate study with an emphasis in gerontology is available from the center in the form of student assistantships and tuition.

GEY 6646—Issues and Concepts in Gerontology (4) A multidisciplinary, team-taught survey of the field.
Other courses with aging content are listed in regular academic departments and can be applied to the graduate certificate.

HEALTH AND HOSPITAL ADMINISTRATION
College of Health Related Professions

GRADUATE FACULTY 1979-80
Chairman & Graduate Coordinator: B. R. Greene. *Professor:* J. M. Champion. *Associate Professors:* R. A. Elnicki; B. R. Greene; K. E. Kilpatrick. *Assistant Professors:* R. G. Garrigues; F. E. West.

The Program in Health and Hospital Administration offers the following courses as part of the major sequence leading to the degree Master of Business Administration with a concentration in health and hospital administration; the degree is offered by the College of Business Administration. Requirements for this degree are described more fully in the section of the *Catalog* dealing with requirements for the Master of Business Administration.

For admission to courses listed below, the student must have been admitted to the Graduate School, College of Business Administration, and to the program in health and hospital administration.

HCA 6101—Perspectives in Health Services Administration (4) An examination of the character and purpose of the provision of health services in the United States. Particular attention is directed to planning, organization, financing, and delivery of personal health services.
HCA 6201—Financial Administration of Health and Hospital Care (3) Analysis of sources and uses of health care funds.
HCA 6302—Hospital Organization and Management (4) An introduction to the analysis of the hospital as a complex organization. Emphasis is placed on the organization and operation of selected functions of the hospital, policy making roles, and aspects of institutional planning.
HCA 6401—Introduction to Rehabilitation Facility Administration (2) Rehabilitation process as it relates to administration of rehabilitation facilities; history and philosophy of the rehabilitation movement; system of delivering rehabilitation services.
HCA 6433—Health and Disease (4) Examination of conceptual issues in defining and measuring health, illness and disease, with an emphasis on the social and cultural dimensions of these concepts.
HCA 6611—Health Planning (4) Analytic examination of Health Planning especially in the United States. Emphasis on area wide planning and the delivery system rather than single institutional activities.
HCA 6691—Seminar in Health and Hospital Administration (2) Formal study, through readings, lectures, and case discussions, of major issues and problems in hospital organization and management.
HCA 6717—Research in Health and Hospital Administration (5) Directed investigation of an administrative problem fundamental to health and hospital administration.
HCA 6811—Residency in Health and Hospital Administration (2; max: 4) Supervised field work in the administrative setting. Designed as a sequence of two quarters. S/U.
HCA 6905—Individual Study in Hospital Administration (2)
HCA 6930—Special Topics in Health Services Adminstration (1-5) Selected topics in theory and research in health services administration.

HEALTH EDUCATION AND SAFETY
College of Physical Education, Health, and Recreation

GRADUATE FACULTY 1979-80
Acting Chairman: D. A. Hicks. *Graduate Coordinator:* B. A. Rienzo. *Professors:* S. W. Fagerberg; D. A. Hicks; W. T. Sandefur. *Assistant Professors:* B. A. Rienzo; J. W. Varnes.

The Master of Health Education (nonthesis) and the Master of Arts in Health Education (thesis) degrees are offered in the Department of Health Education and Safety.

Concentrations of study are developed in community and/or school health education. There is opportunity to pursue interests in a variety of multidisciplinary areas such as consumer health, drug abuse, environmental health, human sexuality, patient health education, population control, and other critical health problem areas.

Since the health education curriculum is individualized, applicants with bachelor's degrees from a wide variety of related fields are accepted into the program. Previous work will be evaluated in light of the student's goal(s).

HES 5245—Patient Health Education (4) Health education theory and principles applied in the primary health care setting.
HES 5935—Current Topics in Health Education (1-5) *Prereq: permission of department chairman.* Offered upon request to meet special interests not adequately covered in other courses.
HES 6125—Scientific Foundation of Health (4) Examination and interpretation of the scientific basis of factors which influence and modify the health potential of the individual and the community.
HES 6165—Issues and Trends in Health Education (4) Emphasis is placed on the current directions in health education with the study of local, national, and international issues and priorities.
HES 6266—Epidemiology and Community Health (4) Comprehensive health planning and the use of epidemiological

procedures in the study of community health problems and needs. Includes theoretical basis of health behaviors among individuals and groups.

HES 6328—Health Education in the Community and School (4) Basic principles of health education for various community settings, and the use of communication media in joint planning for comprehensive health education.

HES 6904—Readings in Health Education (3; max: 6) Directed individual readings and investigations of special areas in health education, with seminar lectures and presentations.

HES 6905—Directed Independent Study (1-5; Max: 10) Individual projects under faculty guidance.

HES 6910—Supervised Research (1-5)

HES 6940—Supervised Teaching (1-5)

HES 6945—Workshop Series in Health Education (1-10)

HES 6971—Research for Master's Thesis (1-15)

HLP 6323—Evaluation Procedure in Health Education and Physical Education (4)

HLP 6345—Research Methods (4) SOC 6501—Methods of Social Research (5)—is an acceptable substitute.

HEALTH RELATED PROFESSIONS—GENERAL

College of Health Related Professions

Acting Dean: L. C. Hammer.

The following courses are offered under the supervision of the office of the dean by an interdisciplinary faculty and deal with material of concern to two or more of the areas of specialty offered in the College of Health Related Professions. These courses are also open to students of other colleges, with the permission of the course instructor.

HSC 6905—Individual Study in Health Related Professions (3-5; max: 10)

HSC 6910—Supervised Research (1-5)

HSC 6939—Special Topics (1-5; max: 10)

HSC 6940—Supervised Teaching (1-5)

LIN 5711—Laboratory Study of Emergent Language Behavior (4)

HISTORY

College of Liberal Arts and Sciences

GRADUATE FACULTY 1979-80

Chairman: D. Bushnell. *Graduate Coordinator:* D. M. Chalmers. *Graduate Research Professor:* W. Woodruff. *Distinguished Service Professors:* L. N. McAlister; S. Proctor. *Professors:* D. Bushnell; D. M. Chalmers; R. T. Chang; H. J. Doherty, Jr.; A. L. Funk; M. V. Gannon; C. C. Goslinga; N. W. Macaulay, Jr.; J. K. Mahon; H. W. Paul; C. F. Sidman; C. C. Sturgill; A. Suarez. *Associate Professors:* A. F. Blakey; D. R. Colburn; S. S. Conroy; M. G. Cox; R. H. Davis, Jr.; M. L. Entner; G. E. Pozzetta; C. J. Sommerville; N. W. Wilensky; H. A. Wilson; G. D. Winius. *Assistant Professors:* G. S. Henry; T. L. Savitt.

The Department of History offers the degrees Master of Arts and Doctor of Philosophy. The nonthesis degree, Master of Arts in Teaching, is also offered with a major in history. The master's degree may be taken with specialization in Medieval, European, British, United States, Latin American, East Asian, or African history. Candidates for the Master of Arts degree who specialize in United States or Latin American history may also take a second field of specialization in applied history. The Doctor of Philosophy degree may be taken with specialization in United States, European, or Latin American history.

Applicants must furnish to the department the following evidence of aptitude and interest: (1) completion of at least 40 hours of history at the undergraduate or graduate level; (2) three references from persons competent to evaluate the applicant's potential for graduate work; (3) an essay of from three to five double-spaced typewritten pages identifying the applicant's career goals and particular regional, temporal, or topical interests within the general field of history, and if possible, thesis or dissertation interests; (4) verbal-quantitative GRE score of 1100.

In addition to meeting the requirements of the Graduate School, degree candidates must have completed one course in statistics and meet the following departmental requirements:

Master of Arts in Teaching—(1) At least 28 credits in history, including five in HIS 6060 or 6061; (2) at least eight credits in a minor outside history; (3) nine credits in a departmental internship in teaching through registration in SED 6943; (4) reading knowledge of one foreign language.

Master of Arts—(1) 20 credits in the field of specialization; 18 in other fields of history, including five in HIS 6060 or 6061; eight in a minor outside history; (2) a thesis in the field of specialization, with nine credits given under HIS 6971; (3) reading knowledge of one foreign language.

Students specializing in applied history must take (1) at least 22 credits of applied history courses, which may be counted toward the requirement in other fields of history; (2) HIS 6061 and either HIS 6084 or 6063. In applied history, a proficiency in computer techniques may be substituted for a reading knowledge of a foreign language, and a project equivalent in creative work may be offered in place of the traditional thesis.

Doctor of Philosophy—(1) Pass a preliminary examination in the major field to test a candidate's general knowledge and ability of expression; (2) pass qualifying examinations consisting of written examinations in the field of specialization and three minor fields, and a general oral (the minor fields may be selected from among the three fields of doctoral specialization named above and from those listed for the M.A. degree. With the permission of his supervisory committee, the student may substitute for one of the listed fields a minor which relates directly to his primary teaching and research interests); (3) HIS 6060, 6061, and 7289; (4) reading knowledge of at least one foreign language; (5) a teaching internship of six credits through registration in SED 6943; (6) a dissertation in the field of specialization for which credit is given under HIS 7980.

The Department of History participates in cooperative programs for the M.A. degree with the University of North Florida and for the Ph.D. with Florida Atlantic University. Students in these programs may take part of their work at the participating institutions under the direction of UNF or FAU faculty who are also members of the graduate faculty of the University of Florida.

Courses at the 4000 level may be selected under the "Topics" sequence.

AFH 5934—Topics in African History (4; max: 16)

AFH 6934—Africa (5; max: 15)

AMH 5905—Special Studies (4; max: 16)

AMH 5930—Topics in United States History (4; max: 16)

AMH 6117—Colonial America (5) English colonies from their origins to about 1781.

AMH 6149—United States, Early National (5) From 1781 to the end of the War of 1812.

AMH 6169—United States, the Middle Period (5) From 1815 to 1850.
AMH 6179—United States, Division and Reunion (5) From the War with Mexico to 1877.
AMH 6201—The Emergence of Modern America (5) From 1877 to the entrance of the U.S. into World War I.
AMH 6239—America Between the Wars (5) From U.S. entrance into World War I to U.S. entrance into World War II.
AMH 6279—Recent America, Since 1945 (5)
AMH 6379—The United States in the World Economy, 1783-1960 (5) Interrelatedness of the United States economy with the economies of other lands; circumstances which have enabled the American people to alter the course of world history.
AMH 6393—Seminar in American Thought (5; max: 15)
AMH 6498—Seminar in United States Urban-Ethnic History (5; max: 10)
AMH 6549—Seminar in the History of American Military Policy (5; max: 10)
ASH 5388—Topics in East Asian History (4; max: 16)
ASH 6904—Readings in Japanese History (5; max: 15)
EUH 5546—Topics in British History (4; max: 16)
EUH 5934—Topics in European History (4; max: 16)
EUH 6126—The Middles Ages (5; max: 15)
EUH 6213—Europe, 1500-1763 (5)
EUH 6289—Readings, Modern Europe (5; max: 15)
EUH 6298—Seminar in History of Modern European Thought (5; max: 15)
EUH 6320—Eastern Europe (5)
EUH 6339—Central Europe (5)
EUH 6342—Western Europe Since 1763 (5)
EUH 6508—England (5; max: 15)
HIS 6060—Theories and Methods I (5) Historical theory.
HIS 6061—Theories and Methods II (5) Varieties and methods of historical research.
HIS 6063—Introduction to Quantitative History (5)
HIS 6084—History, Philosophy, and Purposes of Museums (4)
HIS 6148—Historians and American Society (5; max: 10) Historiography. Seminar in the analysis of works of important historians on the American people. Consideration of schools, theories, philosophies, and functions of history.
HIS 6480—Seminar in History of Science (4) The seminar will be arranged topically. Subject matter will be selected either according to period (example: 17th century science) or as a conceptual unit (example: History of modern evolutionary theory). May be repeated with change of topic.
HIS 6905—Individual Study (5; max: 20)
HIS 6910—Supervised Research (1-5; max: 5)
HIS 6940—Supervised Teaching (1-5; max: 5)
HIS 6971—Research for Master's Thesis (1-15) *Required of all candidates for the M.A. degree.*
HIS 7289—Comparative History (5; max: 15) *Required of all candidates for the Ph.D. degree.*
HIS 7980—Research for Doctoral Dissertation (1-15) *Required of all candidates for the Ph.D. degree.*
LAH 5934—Topics in Latin American History (4; max: 16)
LAH 6938—Seminar in Latin American History (5; max: 15)

HORTICULTURAL SCIENCE
College of Agriculture

GRADUATE FACULTY 1979-80

Chairman: W. J. Carpenter.

Fruit Crops

Chairman: M. J. Burke. *Graduate Coordinator:* D. W. Buchanan.

Ornamental Horticulture

Chairman: W. J. Carpenter. *Graduate Coordinator:* T. J. Sheehan.

Vegetable Crops

Chairman: D. N. Maynard. *Graduate Coordinator:* D. J. Cantliffe.

Professors: J. A. Attaway; R. H. Biggs; H. H. Bryan; D. W. Buchanan; M. J. Burke; C. W. Campbell; W. J. Carpenter; C. A. Conover; H. W. Ford; J. F. Gerber; W. Grierson; C. B. Hall; J. N. Joiner; R. J. Knight, Jr.; R. C. J. Koo; A. H. Krezdorn; C. D. Leonard; S. J. Locascio; S. E. Malo; D. N. Maynard; G. A. Marlowe, Jr.; M. E. Marvel; J. Montelaro; R. T. Poole; H. J. Reitz; T. J. Sheehan; W. B. Sherman; J. Soule; I. Stewart; B. D. Thompson; S. H. West. *Associate Professors:* L. G. Albrigo; C. E. Arnold; M. J. Bassett; D. J. Cantliffe; A. E. Dudeck; G. W. Elmstrom; D. D. Gull; L. H. Halsey; M. A. Ismail; C. R. Johnson; S. R. Kostewicz; D. B. McConnell; R. L. Phillips; J. R. Shumaker; T. A. Wheaton; G. J. Wilfret; W. J. Wiltbank. *Assistant Professors:* C. P. Andrews; J. J. Augustine; C. R. Barmore; J. E. Barrett; W. E. Barrick; W. S. Castle; C. E. Crews, Jr.; T. L. Davenport; B. Dehgan; L. C. Hannah; L. K. Jackson; P. M. Lyrene; T. A. Nell; B. O. Tjia; J. M. White; R. D. William; M. J. Young.

The Department of Fruit Crops, Ornamental Horticulture, and Vegetable Crops offer a joint program in Horticultural Science leading to the Master of Agriculture, Master of Science, and Doctor of Philosophy degrees with specialization in fruit crops, ornamental horticulture, or vegetable crops.

Areas of emphasis include crop physiology and biochemistry, seed physiology, crop breeding and genetics, environmental science, crop production and management, landscape horticulture, and postharvest physiology, biochemistry, and handling.

New graduate students should have sound undergraduate training in horticulture or plant science which should include 18 to 24 undergraduate credits in fruit crops, ornamental horticulture, vegetable crops, or general horticulture and botany, mathematics, chemistry, soils, entomology, and plant pathology or equivalent. Student interest and available guidance and facilities will determine the area of emphasis within a given specialization for the thesis or dissertation problem. It is possible to conduct certain types of research for the Master of Science and Doctor of Philosophy degrees at one of the Agricultural Research and Education Centers or Agricultural Research Centers of the Institute of Food and Agricultural Sciences.

FRC 5244—Current Citrus Research in Florida (5) *Prereq: FRC 3212.* A comprehensive survey of research being conducted in the several areas of citrus production at the Agricultural Research and Education Center, Lake Alfred. Students will be in residence at the Center for 4 weeks. Offered alternate (odd-numbered) years.
FRC 6233—Citriculture (5) Citrus growing, emphasizing the problems by varying sites, soils, climates, rootstocks, and cultivars.
FRC 6243—Citrus Production Management (5) Methods of tabulating and evaluating the functions of citrus trees in relation to fruit production. Actual field recognition of the various factors and the means of properly organizing field management.
FRC 6252—Advanced Tropical Fruit Crops (4) *Prereq: FRC 4251 or equivalent.* Literature review and application of research results to horticultural problems of perennial fruit crops consumed fresh or which require processing before utilization.
FRC 6256—Tropical Fruit Production and Research in Florida (5) A comprehensive study of tropical fruit production and research at the Agricultural Research and Education Center at Homestead and field locations in South Florida. (Students will be in residence for four weeks at the Center. Offered alternate years in SS.)
HOS 6112—Morphology of Horticultural Crops (5) *Prereq: BOT 5225.* Morphological features of tropical and temperate zone horticultural corps, their modification by environment, and their relation to cultural practices and production problems.

HOS 6122—Taxonomy of Horticultural Crops (5) *Prereq: BOT 3303*. Nomenclature, classification and identification of tropical and temperate zone horticultural crops, with emphasis on the scientific basis and utility of the various systems.

HOS 6201—Perennial Horticultural Crop Breeding (5) *Prereq: AGR 3303.* Principles of woody horticultural crop breeding and varietal improvement, including patterns of evolution, mechanisms of heredity, and genetic parameters. Specific breeding problems in tropical and deciduous fruit and ornamental crops.

HOS 6212—Herbaceous Horticultural Crop Breeding (3) *Prereq: AGR 3303.* Techniques in breeding herbaceous crops for horticultural qualities and for resistance to diseases and animal pest; and methods of testing new introductions.

HOS 6231—Biochemical Genetics of Higher Plants (4) *Prereq: AGR 3303 or PCB 3060 and 4535 or equivalents.* Discussion of current evidence bearing on gene function and regulation, examples of the use of plant mutants in the elucidation of biochemical pathways, and examination of somatic cell genetics in higher plants.

HOS 6311—Seed Physiology (5) *Prereq: BOT 3503.* Study of the dormancy, germination, growth, and development of seeds and the life processes involved; methods of handling and processing.

HOS 6331—Postharvest Physiology (5) *Prereq: BOT 3503 and VEC 4452, ORH 4263 or FRC 4612 or equivalent.* Advances in plant physiology and other areas of science applied in quality maintenance and postharvest handling of fruit, vegetable, and ornamental crops.

HOS 6351—Chemical Regulators of Horticultural Crops (4) Physiology and biochemistry of chemical regulators as related to horticultural crops, with emphasis on manipulative practices.

HOS 6361—Rootstock-Scion Relationships (5) Influence on disease susceptibilities, soil and climatic adaptations, bud-union incompatibilities and production.

HOS 6412—Nutrition of Horticultural Crops (5) *Prereq: BOT 3503 and ORH 4411 or FRC 4411, or equivalent.* Physiological, biochemical and environmental factors influencing nutritional status of horticultural plants and the resulting effects on growth, yield, and quality.

HOS 6611—Agricultural Meteorology (5) Climate and meteorology of the biosphere in relation to horticultural crops. Heat budget of the plant-soil surface, turbulent transport, evapotranspiration, frost protection, and agricultural climatology.

HOS 6631—Environmental Measurements (3) *Prereq: consent of instructor.* Methods and techniques employed in the characterization of the biosphere. Sensor selection, measuring and recording equipment for light, wind, temperature, humidity, and heat flow.

HOS 6905—Nonthesis Research in Horticultural Science (1-5; max: 5)

HOS 6910—Supervised Research (1-5)

HOS 6931—Horticultural Science Seminar (1; max: 4) Oral presentation of material in one of the following areas: literature review related to the student's research, research results, or a published paper of relevance to horticulture. Subject matter will be determined by the instructor. S/U.

HOS 6932—Topics (2-5; max: 10) Study of contemporary research in horticultural science.

HOS 6940—Supervised Teaching (1-5)

HOS 6941—Practicum in Horticultural Science 2-5; max: 10) Admission limited to graduate students majoring in horticultural science. Supervised and individual work in professional areas of horticulture.

HOS 6971—Research for Master's Thesis (1-15)

HOS 7980—Research for Doctoral Dissertation (1-15)

ORH 6223—Research and Development in Turfgrass Science (4) *Prereq: ORH 4221 and lab.* Principles and practices of turfgrass improvement and management, including propagation, nutrition, physiology, soil management, and experimental methods applied to turf research.

VEC 6251—Advanced Olericulture (5) *Prereq: BOT 3503.* Survey of scientific knowledge related to production of vegetable crops.

IMMUNOLOGY AND MEDICAL MICROBIOLOGY
College of Medicine

GRADUATE FACULTY 1979-80

Chairman: K. I. Berns. *Graduate Coordinator:* G. E. Gifford. *Professors:* E. M. Ayoub; K. I. Berns; L. W. Clem; R. B. Crandall; G. E. Gifford; J. E. McGuigan; J. W. Shands, Jr.; P. A. Small, Jr.; M. D. Young. *Associate Professors:* H. Baer; D. C. Birdsell; Y. M. Centifanto; D. H. Duckworth; R. Halliwell; E. M. Hoffmann; L. O. Ingram; R. Panush; S. T. Shulman; R. S. Weiner. *Assistant Professors:* W. B. Clark; B. Flanegan; J. M. Gaskin; W. W. Hauswirth; W. K. Holloman; V. Maino; B. J. Mansheim, Jr.; N. Muzyczka; K. Rand; J. L. Stein.

The Department of Immunology and Medical Microbiology offers programs leading to the Master of Science and Doctor of Philosophy degrees in the medical sciences, with specialization in immunology and microbiology.

Specific areas of specialization include infectious diseases, cellular and humoral immunity, immunochemistry, molecular genetics, parasitology, dental microbiology, and bacterial and animal virology.

The undergraduate preparation for graduate study should be wide in scope and should include general biology, physics, chemistry (two to three years, including organic and physical chemistry), and preferably statistics, calculus, genetics, and bacteriology. A bachelor's degree in bacteriology or microbiology is not required. In graduate school the student will at first obtain a general background in microbiology as preparation for research and teaching. The remaining course work should be arranged according to the student's interests and competence. Through individual planning of course work, research, and teaching, the graduate student is offered an educational atmosphere to help him develop certain skills and gain intellectual independence and initiative.

BMS 5300—Microbiology (7) Introduction to the study of microbiology.

BMS 5301—Medical Parasitology (2) Introduction to the major groups of animal parasites infecting man, with special emphasis on life history, epidemiology, and laboratory diagnosis.

BMS 6305—Parasitic Diseases of the Tropics and Subtropics (5) Animal parasitology covering mechanisms of parasitic infections, physiology of parasites, and immune responses of the host.

BMS 6310—Microbiology I (6) Intensive review of principles of immunity, physiology and genetics of bacteria, virology, infection, and ecology.

BMS 6311—Microbiology II (3)

BMS 6312—Biology of Uncommon Microorganisms (5) Natural distribution, metabolic activities, isolation, and culture of selected groups of microorganisms.

BMS 6312L—Immunology Laboratory (3)

BMS 6314—Principles of Immunology (5) Biological and biochemical aspects of host resistance and immunity; the chemical and physiochemical properties of the proteins of immune reactions.

BMS 6321—Special Topics in Microbiology (1-6; max: 18) Contemporary research in an aspect of general microbiology.

BMS 6322—Public Health Microbiology (1-6; max: 18) *Prereq: consent of director of laboratories.* Reference study, laboratory practice of diagnostic techniques in Microbiology Diagnostic Laboratories, Shands Teaching Hospital, University of Florida Health Center, or in residence at Bureau of Laboratories, State Department of Health, Jacksonville.

BMS 6323—The Literature of Microbiology (3) Bibliographic

method in searching the literature of specified areas of the discipline.

BMS 6324—Research Planning (5) Scientific research, including initiating a problem, experimental techniques, analysis and evaluation of data, reporting; illustrated by microbiological examples.

BMS 6330—Virology (5) Nature of viruses and mechanisms of viral infection: animal, bacterial, and plant viruses.

BMS 6330L—Virology Laboratory (3) Laboratory experiments on the nature of viruses and mechanisms of viral replication; other consequences of viral infections.

BMS 6331—Viral Diseases (3) Pathogenesis of viral disease including cytopathic and oncogenic viruses. Diagnostic and preventive measures.

BMS 6350—Microbial Metabolism (5) Intermediary metabolism of microorganisms; metabolic pathways that are unique or characteristic primarily of microorganisms.

BMS 6351—Microbial Physiology (5) Structural and functional elements of microorganisms and mechanics of their regulatory systems. Mechanisms of control of microbial DNA replication, cell division, ribosome and cell wall formation; kinetic studies of normal and abnormal growth.

BMS 6352—Microbial Genetics (5) Microbial genetics, including mutation, selection, transformation, transduction, conjugation, and episomal factors; molecular structure and function of genes.

BMS 6353—Microbial Infections (5) Pathogenesis of selected bacterial and fungal diseases, emphasizing the clinical and pathological aspects of human infection.

BMS 6354—Regulation in Biological Systems (5) Control of enzyme activity: kinetic, structural, inhibition (allosteric and nonallosteric), and energy level control; permeases; control of enzymes synthesis; positive and negative; repression, induction, catabolic repression, cyclic AMP; hormonal control.

BMS 6360—Experimental Microbiology (2-5; max: 8) Application of physical, chemical, and biological techniques to experimental problems in microbiology. Individual laboratory study under supervision.

BMS 6930—Seminar (1; max: 12) S/U.

BMS 7313—Clinical Immunology (2) Principles of basic immunology and immune reactions important in human disease, such as immediate and delayed hypersensitivity, immune complexes, the Arthus phenomenon, graft rejections.

BMS 7931—Research Conference (1; max: 12) Critical discussion and appraisal of research programs of faculty and students of the department. S/U.

BMS 7932—Journal Colloquy (1; max: 12) Critical presentation and discussion of recent original articles in the microbiological literature.

INDUSTRIAL AND SYSTEMS ENGINEERING

College of Engineering

GRADUATE FACULTY 1979-80

Chairman: D. J. Elzinga. *Graduate Coordinator:* D. W. Hearn. *Graduate Research Professor:* R. E. Kalman. *Professors:* J. F. Burns; D. J. Elzinga; R. L. Francis; T. J. Hodgson; K. E. Kilpatrick; R. S. Leavenworth; E. P. Martinson *(Emeritus);* E. J. Muth; J. A. Nattress; B. D. Sivazlian; D. B. Wilcox *(Emeritus). Associate Professors:* M. Ariet; B. L. Capehart, K. E. Dominiak; D. W. Hearn; J. F. Mahoney: R. W. Swain; P. E. Valisalo.

The Department of Industrial and Systems Engineering offers the Master of Engineering and the Master of Science, each with a thesis or nonthesis option, with specialization in computer science, industrial engineering, operations research, and systems engineering. In addition, the department offers the Engineer degree and the Doctor of Philosophy degree with specialization in industrial engineering, operations research, and systems engineering.

A degree in one of the engineering disciplines or in mathematics, statistics, or physics is prerequisite. Where the student's background is deficient, an articulation program of foundation courses will be required.

ECM 6260—Numerical Techniques for Linear Systems (3) *Prereq: Linear algebra and calculus.* Intensive analysis of Gaussian elimination. LU decomposition, floating point round-off analysis, iterative improvement. Storage and manipulation of sparse matrices. Other topics in linear computation.

EIN 5244—Measurements in Bioengineering (3) Modern techniques for measurements and quantification of physical, physiological, and psychological responses of man to stimulus. Utilization of these measurements in industrial, medical, and sports fields.

EIN 6115—Information Systems (3) Introduction to information theory and coding, document and reference retrieval, fact and information retrieval, measures of effectiveness, mathematical models of retrieval systems, and schemes for the storage of information.

EIN 6246L—Human Factors Engineering (3) *Prereq: Course in human engineering or perceptual psychology.* Effects of human factors on the performance of systems containing extensive man-machine interactions.

EIN 6247—Man-Machine Systems Design (3) *Prereq: EIN 6246L or instructor's approval.* Engineering design concepts of interfaces between man and machine.

EIN 6249—Behavior Systems Engineering (3) *Prereq: EIN 6246L.* Behavioral and engineering principles underlying prediction and management of human behavior, design of organization systems, and development of synthetic behavior systems.

EIN 6318—Work Measurement Theory (3) *Prereq: EIN 3314L, ESI 4312, STA 4321.* Systems of work measurement and work methods. Comparisons of systems.

EIN 6338—Advanced Production Control (3) *Prereq: ESI 5308, 6317.* Production planning and control; problem identification and formulation.

EIN 6348—Mathematical Theory of Inventory (3) *Prereq: ESI 6317, SAT 6826.* Mathematical theory of inventory systems. Single- and multicommodity inventory problems analyzed as problems in dynamic programming and as Markov decision processes.

EIN 6357—Advanced Engineering Economy (3) *Prereq: STA 4321, ESI 5308.* Mathematical models for expenditure analysis under uncertainty. Relationship between investment decision criteria and microeconomic theory. Capital planning and budgeting. Decisions involving expansion, acquisitions, replacement, and disinvestment.

EIN 6358—Decision Theory (3) *Prereq: EIN 6357, ESI 6317.* Formulation of decision criteria and decision strategies in a probabilistic environment. Industrial applications of input-output analysis and von Neumann-Morgenstern utility theory. Statistical decision functions.

EIN 6367—Facilities Systems Design (3) *Prereq: EIN 4365, ESI 6317.* Facilities planning, including information analysis, man-machine requirements, facility location methodologies, material handling analysis, storage and warehousing, assembly line balancing, and physical distribution.

EIN 6388—Statistical Forecasting Models (3) *Prereq: ESI 4567, STA 4322.* Classification of models for forecasting. Polynomial and autoregressive models. The Box Jenkins Method. Estimation of model parameters. Analysis of industrial data.

EIN 6508—Health Systems Analysis I (4) Introduction to quantitative analysis, total value analysis, resource allocation techniques, stochastic service systems, simulation, quality of care audits and hospital control and management systems.

EIN 6509—Health Systems Analysis II (4) Prereq: EIN 6508. Stochastic aspects of hospital and health systems and the influence of variability and uncertainty in health management decisions.

EIN 6905—Special Problems (1-9; max: 18) Laboratory, lecture, field work, or conferences.

EIN 6910—Supervised Research (1-5)

EIN 6918—Graduate Seminar (1) May be repeated for additional credit. S/U.

EIN 6939—Seminar in Applied Stochastic Processes (3) *Prereq: ESI 6546 or 6547 and consent of instructor.* Lectures on advanced topics. Student presentation and discussion of research papers. Development of research topics.
EIN 6940—Supervised Teaching (1-5)
EIN 6971—Research for Master's Thesis (1-15)
EIN 7933—Special Problems (1-9; max: 18) Laboratory, lecture, field work, or conferences.
EIN 7980—Research for Doctoral Dissertation (1-15)
ESI 5125—Analog Simulation Techniques (3) *Prereq: ESI 3123.* Analog computer simulation techniques as applied to chemical processes, mechanical, and electromechanical systems, and random phenomena. Solutions to problems in optimization and economic systems. Methods of testing model accuracy.
ESI 5135—Hybrid Computer Techniques (3) *Prereq: ESI 3123 or 4554.* Hybrid computer systems and their use in solution of problems in systems analysis. Special emphasis on software. Conversion techniques associated with digital-to-analog and analog-to-digital.
ESI 5236—Reliability Engineering (3) *Prereq: STA 4321.* Mathematical models and methods of reliability engineering. Typical component failure distributions system reliability as a function of component reliability. Reliability block diagrams and fault trees.
ESI 5307—Operations Analysis I (3)
ESI 5308—Operations Analysis II (3)
ESI 5570—Digital Computer Techniques (3) *Prereq: ESI 3502, 4567.* Numerical methods for dealing with linear and nonlinear algebraic systems, eigenvalue and eigenvector problems, optimum seeking problems, and ordinary differential equations, including error, stability, and efficiency analysis.
ESI 5571—Digital Computer Techniques (3) *Prereq: ESI 5570.* Sophisticated techniques for solving integrodifferential equations, boundary and characteristic value problems, and partial differential equations.
ESI 6127—Analog Computer Techniques (3) *Prereq: ESI 5125.* Analog computer techniques to study complex systems. Analog computer logic as an additional tool in problem solving. Boundary value problems and dynamic parameter optimization techniques.
ESI 6136—Analog-Hybrid Systems (3) *Prereq: ESI 6127.* Hybrid computer systems, both hardware and software. Sampling theory, quantizing theory, and error analysis. Hybrid computer techniques for solving partial differential equations and optimization problems. Examples of adaptive control systems.
ESI 6137—Advanced Hybrid Computer Techniques (3) *Prereq: ESI 5125.* Hybrid computer techniques superior to digital or analog techniques. Boundary value, dynamic parameter optimization, fluid network simulation, optimal control and techniques such as random search, steepest ascent, gradient methods, dynamic programming, and the maximum principle.
ESI 6222—Statistical Quality Control (3) *Prereq: STA 4321 or 6206; ESI 5308.* Theoretical basis for control charts on variables and attributes data. Cumulative sum control charts. Mathematics of sampling plans for attributes and variables. Bayesian decision rules. Evolutionary operation.
ESI 6239—Reliability Theory (3) *Prereq: Maxtrix theory, STA 4322, ESI 5236.* Reliability models as a function of system configurations. Reliability prediction for various underlying component failure laws. Sensitivity analysis. Models of interdependent systems.
ESI 6316—Mathematical Methods of Operations Research I (3) *Prereq: Matrix theory, transform theory, probability theory.* Topics covered include theory of queues, classical optimization, and linear programming.
ESI 6317—Mathematical Methods of Operations Research II (3) *Prereq: ESI 6316.* Dynamic programming, nonlinear programming, the maximum principles, game theory, and decision theory.
ESI 6337—Queuing Theory (3) *Prereq: Matrix theory, transform theory, STA 6826.* Classification of queuing systems and waiting line problems. Model formulation. Analysis of selected systems. Applications to engineering systems.
ESI 6349—Markov Decision Processes for Engineers (3) *Prereq: ESI 6438, STA 6826, ESI 6417.* Markov and semi-Markov decision processes, dynamic programming solutions, fractional linear programming solutions, computational techniques, analysis of industrial and engineering data, applications.
ESI 6358—Games and Gaming (3) *Prereq: Matrix theory, probability theory.* Games in extensive and normal form. Two-person games. Formulation of two-person games as a linear programming problem. Cooperative and noncooperative games. Concepts and methods of gaming, including experimental management gaming.
ESI 6408—Introduction to Optimization Theory (3) *Prereq: linear algebra, advanced calculus.* Conditions for maxima and minima of differentiable functions; unconstrained, equality constrained, and inequality constrained functions.
ESI 6417—Linear Programming (3) *Prereq: matrix theory.* Theoretical and computational aspects of the simplex method. Duality theory, parametric analysis, sensitivity analysis, and selected topics.
ESI 6418—Extensions of Linear Programming (3) *Prereq: ESI 6408, 6417.* Algorithmic extensions of the simplex method of linear programming. Large-scale linear programs. Extensions to nonlinear problems.
ESI 6429—Nonlinear Programming (3) *Prereq: ESI 6408, 6418.* Optimization techniques for static and dynamic nonlinear systems subject to various constraints. Inequality theorems, geometric programming, convex programming, decomposition, and optimum seeking methods.
ESI 6438—Dynamic Programming (3) *Prereq: ESI 6408.* Characterization of multistage decision problems as a sequence of single-stage problems. Functional equation of dynamic programming, composition, and Mitten's sufficiency condition. Markovian decision problems, state variable reduction techniques, and related approximation schemes.
ESI 6439—Dynamic Optimization Theory (3) *Prereq: ESI 6408, 6438.* Dynamic programming approach to the necessary conditions of variational calculus. Pontryagin's maximum principle, continuous and discrete. Comparison of variational approach and dynamic programming from a computational point of view.
ESI 6448—Discrete Optimization Theory (3) *Prereq: ESI 6417, 6458.* Modeling and theory associated with optimization problems where some variables are restricted to integer values. Relationships between network flow algorithms and linear programming. Matching and Chinese Postman problem. General integer programming algorithms.
ESI 6458—Flows in Networks (3) *Prereq: college algebra.* Mathematical formulations and solution techniques for general flow problems including the techniques of implicit enumeration. Applications to problems of scheduling, routing, and network design in industrial, environmental, and transportation contexts.
ESI 6499—Advanced Topics in Mathematical Programming (1-4) *Prereq: consent of instructor.* Lectures on selected topics of an advanced nature in mathematical optimization and its applications. Students give presentations on selected research papers. May be repeated with change of content.
ESI 6508—Systems Analysis I (3) *Prereq: ESI 4568, STA 4321, EEL 4657.* Review of linear systems. State variable methods for systems analysis. Techniques of modeling. Computer methods. Application to control problems.
ESI 6509—Systems Analysis II (3) *Prereq: ESI 6508.* Optimal control theory and system optimization techniques. Statistical methods of data analysis. Estimation theory. Kalman filtering.
ESI 6526—Industrial Dynamics I (3) *Prereq: Computer programming and probability theory.* Dynamics of industrial systems, emphasizing models that incorporate decision making, its interactions with information, money, orders, material, personnel, and capital equipment, using theories of elementary feedback systems, difference equations, and probability.
ESI 6527—Industrial Dynamics II (3) *Prereq: ESI 6526.* Dynamic simulation models, improvement of system behavior through changes in system structure and decision policy, and the interpretation of simulation results relative to system objective.
ESI 6528—Dynamic Modeling and Simulation (3) *Prereq: STA 6826.* Methods for input-output analysis of complex systems. Computational techniques.
ESI 6529—Digital Simulation Techniques (3) Computer pro-

gramming aspects of digital simulation. Use of simulation languages such as SIMSCRIPT or GPSS. Simulation of large-scale, mathematically indeterminate systems.

ESI 6546—Stochastic Systems Analysis I for Engineers and Scientists (3) *Prereq: STA 6826.* Overview and classification of stochastic processes. Modeling of physical phenomena as stochastic processes. Methodology and applications from systems engineering and operations research.

ESI 6547—Stochastic Systems Analysis II for Engineers and Scientists (3) *Prereq: STA 6826, ESI 6546 or consent of instructor.* Filtered Poisson process. Semi-Markov decision processes and optimal control. Selected applications.

ESI 6548—Stochastic Service Systems (3) *Prereq: ESI 6316.* Modeling of large-scale engineering systems. Input-Output analysis. Methods of handling uncertainty. Optimum design.

ESI 6558—Advanced Systems Design (3) *Prereq: ESI 6509, 6317, EEL 5182.* Application of the techniques of operations research, control theory and systems analysis to the design of systems. Completion of a design project.

INSTRUCTIONAL LEADERSHIP AND SUPPORT
College of Education

GRADUATE FACULTY 1979-80

Chairman & Graduate Coordinator: C. G. Hass. *Professors:* W. Clarke;† R. Crews; W. H. Drummond; C. Dziuban;† W. K. Esler;† H. T. Fillmer; E. C. Fowler;† B. A. Gutnecht;* C. G. Hass; W. D. Hedges; J. W. Hensel; D. E. Hernandez;† D. A. Jacobsen;* M. L. Kysilka;† A. J. Lewis; W. C. Merwin;* W. R. Powell; R. A. Rothberg;† E. L. Wenzel; E. L. Williams. *Associate Professors:* J. S. Cangelosi;* G. D. Lawrence; M. K. Morgan; L. J. Mullally; A. H. Olson;† E. A. Scheirer;* J. N. Shadgett;† A. B. Smith, III; T. J. Sullivan.† *Assistant Professors:* T. R. Blair; B. J. Bolden;* L. Dickerson; S. L. Hiett;† L. L. Smith; E. C. Turner.

These members of the faculty of the University of North Florida (*) and the University of Central Florida (†) are also members of the graduate faculty of the University of Florida and participate in the doctoral program in the University of Florida Department of Instructional Leadership and Support.

The Department of Instructional Leadership and Support offers graduate study in the following areas: educational media and instructional design; post-secondary education; reading; supervision and curriculum development; and vocational, technical, and adult education. Courses are listed below under each of these specialization areas with additional listing of general courses provided by the department.

Programs leading to the Master of Education and Master of Arts in Education degrees are offered with specializations or subspecializations in educational media and instructional design; reading; health occupations education; health occupations education—dentistry; technical education; adult education; and vocational, technical and adult education. Specialized graduate study leading to the degrees of Specialist in Education, Doctor of Education, and Doctor of Philosophy is offered in these areas and also in post-secondary education, in curriculum and instruction theory and research, and in supervision and curriculum development.

For curriculum courses in elementary education, middle school education, and secondary school education, see *General Teacher Education.* For subject area courses, see *Subject Specialization Teacher Education.*

General Courses

ECO 6075C—Economics/Consumer Education (4) Objectives, content, resource materials and methods of teaching economic/consumer education in the elementary and secondary schools.

EDG 6250—The School Curriculum (4) *Required in all graduate programs in curriculum and instruction.* Theoretical and research bases underlying the development of the total school program from kindergarten through community college. Basic curriculum course for graduate students.

EDG 6691—Problems in Curriculum and Instruction (3-15; max: 15) Covers topics not available in regularly listed courses. To be used for credit in institutes, workshops, and short credit courses.

EDG 6905—Individual Work (2-5; max: 15) *Student must have approval of proposed project prior to registration in course.* For advanced students who wish to study individual problems under faculty guidance.

EDG 6910—Supervised Research (1-5)

EDG 6931—Special Topics (2-5; max: 15) *Prereq: consent of department chairman.*

EDG 6940—Supervised Teaching (1-5)

EDG 6971—Research for Master's Thesis (1-15)

EDG 7222—Curriculum: Theory and Research (4) *Prereq: EDG 6250.* Theories of curriculum organization and a survey of curriculum research and patterns of curriculum.

EDG 7361—Instruction: Theory and Research (4) *Prereq: EDG 6250.* Theories of instruction and research in the learning process, mental health, creativity, the thought process, human relations, group dynamics, communication, and other fields contributing to instruction theory.

EDG 7665—Bases of Curriculum and Instruction Theory I (4) *Alternates quarterly with EDG 7666. Prereq: EDG 6250 or equivalent.* Application of theory and research in the behavioral sciences to the development of curriculum and instruction theory. Topics include social forces, human development, learning, knowledge, and personality theories.

EDG 7666—Bases of Curriculum and Instruction Theory II (4) *Alternates quarterly with EDG 7665. Prereq: EDG 6250 or equivalent.* Application of theory and research in the behavioral sciences to the development of curriculum and instruction theory. Topics include intelligence, cognition, small group organization, motivation, and attitudes and values theories.

EDG 7941—Field Experience in Curriculum and Instruction (1-5; max: 15) *Admission limited to graduate students in the Advanced School.* Supervised experiences appropriate to the student's professional goals.

EDG 7980—Research for Doctoral Dissertation (1-15)

Educational Media and Instructional Design

EME 6052—Educational Technology Readings (4) Technology available today to aid the teacher in all aspects of the educational process, including an assessment of the strengths and weaknesses of the various components.

EME 6105—Selection of Media Center Materials (4) Selection of print and nonprint materials, including administrative processes and procedures.

EME 6205—Production Graphics (4) Principles of layout and design, and their application to the production and evaluation of media graphics.

EME 6207—Media Center Production Techniques (4) *Prereq: EME 4201.* Designed to train media specialists, materials supervisors and audiovisual coordinators in the use of photographic processes, including darkroom techniques and slide-tape presentations.

EME 6325—Programmed Instructional Materials (4) Evaluation and effective use of programmed instructional materials. Practice in construction of programmed materials provided in student's area of emphasis.

EME 6405—Computer Applications in Education (4) Enables students to communicate with computer technologists and/or apply information about this technology to the solution of educational problems.

EME 6505—Microteaching, Instructional Television and the Classroom (4) Planning, production, utilization, and evaluation of videotaped programs which demonstrate microteaching principles and practices. Portable videotape equipment utilized.

EME 6606—Instructional Development (4) The instructional

development (instructional systems design) process as a means toward precise communication and instructional improvement. Realities of application as well as theoretical constructs.

EME 6716—Educational Technology Center Operation (4) *Prereq: EME 4102.* Organization and operation of school, county, junior college, regional or college learning resource or education technology centers, including arrangement and evaluation of material and equipment.

EME 6805—Cataloging and Classification of Print and Nonprint Materials (4) Standard systems used in an educational setting.

EME 6807—Organization of Reference Sources and Services (4) Basic types of materials, with practice in their selection, use, and evaluation.

EME 6945—Practicum in Educational Media and Instructional Design (4-12) Supervised experiences appropriate to the student's professional goals.

EME 7938—Seminar in Educational Media and Instructional Design (4) Seminar for advanced graduate students.

Postsecondary Education

For subject area methods courses see: Art Education, Business Education, English Education, Foreign Language Education, Mathematics Education, Music Education, Science Education, and Social Studies Education.

EDG 7699—Seminar: Curriculum and Instruction Leadership in Postsecondary Education (1-2; max: 8) An investigation of solutions to current curriculum and instruction problems and issues in postsecondary education.

EDH 6053—The Community Junior College in America (4) Programs, issues, and problems.

EDH 6066—American Higher Education (4) History, philosophy, and policies, with emphasis on current practices and problems.

EDH 6067—Seminar: International Higher Education (2-5) Characteristics of selected foreign higher education systems with emphasis on history and philosophy, access, curriculum and instruction, student and faculty characteristics, governance, management, and finance.

EDH 6305—The Principles and Practices of College Teaching (4) The nature of the teaching-learning process, with particular emphasis on undergraduate curriculum, course planning, educational technology, ways of evaluating the teaching process, and the contributions of psychology to college teaching.

EDH 6946—Practicum in College Teaching II (4) *Prior arrangements must be made with the coordinating professor of the College of Education.* Provision made for the student to teach under the supervision of a professor at either the community college, four-year college, or university level. Seminars cover topics related to improvement of college teaching.

EDH 6947—Practicum in College Teaching I (4-8; max: 12) *Prior arrangements must be made with the coordinating professor of the College of Education.* Provision made for the student to teach under the supervision of a professor at either the community college, four-year college, or university level. Seminars cover topics related to improvement of college teaching.

EDH 7937—Seminar: Curriculum in Higher Education (4) *Prereq: EDH 6053.* Issues and problems in college and university curricula. Emphasis on general education and curriculum evaluation.

Reading

RED 5310—Reading in the Primary Grades (4) Basic course for teaching reading, with emphasis on materials and methods for use with young children at prereading and beginning reading levels.

RED 5337—Reading in the Secondary School (4) Patterns of reading instruction in the secondary school; methods of teaching reading for teachers of all subject areas; preparation, selection, and use of instructional materials; selected field or micro-teaching experiences.

RED 5355—Reading in the Intermediate Grades (4) Basic course, with emphasis on materials and methods for teaching reading to students in upper elementary grades, middle, and junior high schools.

RED 6247—Organization and Supervision of School Reading Programs (4) Procedures for planning, improving, and evaluating reading programs on a system-wide basis.

RED 6447—Selection and Production of Reading Materials (4) Criteria for selection, the principles of production, and the creation and construction of reading materials.

RED 6448—Technology in Reading Instruction (4) Operation and application of equipment, hardware and systems used in reading instruction.

RED 6548—Corrective Reading (4) *Prereq or coreq: RED 6656.* Diagnosis, correction, and prevention of reading difficulties in both elementary and secondary schools; work with children in the application of principles under study.

RED 6646—Problems in Reading (4) *Prereq or coreq: RED 6656.* Specific reading problems, such as those encountered in the classroom situation; will be selected for exhaustive study by individuals or small groups; the teaching of reading on any grade level.

RED 6656—Trends in the Teaching of Reading (4) *Prereq: basic course in teaching reading.* Trends analyzed by study of research; consideration of controversial issues involving classroom organization, methods, and materials.

RED 6667—Issues in High School and Adult Reading (4) Exploration of significant problems, points of view, and trends in high school and adult reading, with an emphasis on research.

RED 6805—Practicum in Corrective Reading (4) *Prereq or coreq: RED 6656.* Diagnosis, correction, and prevention of reading difficulties in both elementary and secondary schools; work with children in the application of principles under study.

RED 7747—Analysis of Theory and Research in Reading (4; max: 12) *Prereq: RED 7819.* Detailed and critical study of outstanding theories and research contributions to the field of reading, with implications for education.

RED 7818—Practicum in Clinical Diagnosis (4) *Prereq: postmaster's status; reading certification or equivalent.* Supervised experience in diagnosis and remedial techniques of severe reading disabilities. Primarily individual tutoring.

RED 7819—Theory of Clinical Procedures in Reading (4) *Prereq: RED 6548, 6805 and eight other 6000 level hours in reading.* Relationships involved in diagnosis, clincal thinking, and judgmental framework with an exploration of diagnostic systems in reading.

RED 7848—Clinical Diagnosis in Reading (4) *Prereq: postmaster's status; reading certification or equivalent.* Supervised experience in diagnosis and remedial techniques of severe reading disabilities. Primarily individual tutoring.

RED 7938—Seminar in Reading (4) *Prereq: RED 6566 and 6646; year of graduate study.* Contemporary issues and research in reading.

RED 7947—Internship in Reading (4; max: 16) *Prereq: advanced graduate standing and prior arrangements made with coordinating professor in reading program area.* Provides for directed practice in the area of reading; students are placed in an approved and supervised field position for practical experience.

Supervision and Curriculum Development

EDG 6046—Contemporary Issues in Career Education (4) Examination of issues, analysis of problems and techniques for integrating career education into the total school curriculum, and evaluation of contemporary research.

EDG 6285—Evaluation in the School Program (4) Procedures and techniques of evaluation in school programs, with particular emphasis on needs assessment, school self-study, and course evaluation.

EDG 7235—Programs of Teacher Education (4) Organization and problems of teacher education institutions; types of students, patterns of curricula, functions of staff, significant organizations and agencies, and special studies.

EDG 7391—Seminar on Instructional Leadership (4) *Prereq: EDA 6192.* Review of theories of change applicable to education. Discussion of roles of instructional leaders using alternative models of change.

EDG 7947—Internship in Teacher Education I (4) Problems

of pre-service teacher education and participation in the planning and teaching of pre-service courses.
EDG 7948—Internship in Teacher Education II (4)
EDS 6140—Clinical Supervision (4) Systematic approaches to supervision of instructional personnel including observation and programs of continuing professional development.

Vocational, Technical, and Adult Education

ADE 5081—Education for Adults (4) Characteristics of the principal age groups in adult education (young, middle-aged, and older adults). Variations added by socioeconomic, other community conditions and implications for adult education programs explored.
ADE 5472—Methods, Materials, and Evaluation in Adult Education (4) Study and use of methods and materials most effective and appropriate for various adult groups. Applications of evaluative principles and procedures to the appraisal of adult education endeavors.
ADE 6385—Teaching in Adult Education (4) Settings, techniques, materials and methods for teaching adults; identification and examination of the problems of the adult learner; evaluation in adult education.
ADE 6671—Adult Education: Progress and Prospects (4) An overview of the historical development and current status of adult education in America; characteristics of the adult learner; trends in adult education.
ADE 7282—Adult Education in the Community College (Junior College) (4) Types of community college programs in adult education. Methods of community survey and ways of identifying and defining educational needs of adults.
ADE 7672—Contemporary Issues in Adult Education (4) Problems, emerging trends, legislation, funding and other contemporary issues in adult education.
EVT 5166—Technical Education Program Development (4) Essentials of educational program planning and development. Objectives, organization, staffing, finances, facilities, surveys, advisory committees, occupational analysis; recruitment, selection, guidance, and placement of students in various occupational programs.
EVT 6167—Curriculum and Organization in Vocational-Technical Health Occupations Education (4) Basic principles and practices in developing curricula in vocational-technical health occupations. Emphasis on curriculum, planning and revision, factors influencing the curriculum, organization of the curriculum and means for evaluating the program.
EVT 6168—Vocational Education and Community Interaction (4) Socioeconomic forces; school-community relationships; employee-employer relationships; principles, concepts, and practices affecting policy and program planning.
EVT 6170—Technical Education in Post High School Programs (4) Analysis of technical education in modern society, with emphasis on college and other post high school programs leading to the Associate of Science or similar degrees or certificates of competency in technical and semi-professional occupations.
EVT 6264—Administration of Vocational Education (4) Basic principles of administering a program on national, state, and local levels.
EVT 6365—Supervision of Vocational Education (4) Concepts and supervisory procedures pertaining to supervision of different facets of local, state, and national programs.
EVT 6381—Teaching Technical Education (4) *Prereq: Bachelor's degree in a technical area.* Objectives, content, resource materials, evaluation, and methods of teaching technical subjects at the post high school level.
EVT 6905—Individual Work in Vocational, Technical, and Adult Education (2-5; max: 15) *For advanced students wishing to study under faculty guidance. Before registering, a student must have approval of the proposed study.* Problems in vocational, technical, or adult education.
EVT 6910—Supervised Research (1-5)
EVT 6933—Special Topics (2; max: 15) *Prereq: consent of department chairman.*
EVT 6940—Supervised Teaching (1-5)
EVT 7661—Contemporary Issues in Technical Education (4) Legislation, funding, accreditation, licensure, and other matters which are potential problem areas in technical education.
EVT 7762—Developing Technical Programs (4) Program planning and development for technical education, including determination of need, development of curriculum, establishment of advisory committees, selection of faculty and students, planning facilities, organizing staff, budgeting, evaluation of program effectiveness, and follow-up of graduates.
EVT 7930—Seminar in Vocational and Technical Education (4) *Prereq: post-master's standing.* Current research and an overview of the total program in vocational, technical, and adult education.

JOURNALISM AND COMMUNICATIONS
College of Journalism and Communications

GRADUATE FACULTY 1979-80

Dean: R. L. Lowenstein. *Graduate Coordinator:* R. N. Pierce. *Distinguished Service Professor:* H. G. Davis, Jr. *Professors:* G. A. Butler; K. A. Christiansen; J.S. Detweiler; M. N. Edwardson; J. L. Griffith; H. H. Griggs; L. J. Hooper; J. P. Jones *(Dean Emeritus);* K. E. M. Kent; R. L. Lowenstein; F. N. Pierce; R. N. Pierce; J. R. Pisani. *Associate Professors:* A. J. Jacobs; R. L. Kendall; E. G. Weston. *Assistant Professor:* M. S. Fregly.

The degree of Master of Arts in Journalism and Communications is offered with a major in communication. Specialization may be in advertising, broadcasting, communication research, international communication, journalism, media management, or public relations.

Prerequisite to admission is a bachelor's degree in advertising, broadcasting, journalism, public relations, or an allied field. The student who does not hold a degree in one of these fields or who does not have adequate preparation in the social sciences and humanities may be required to satisfactorily complete specified undergraduate work.

Each student must follow curricular regulations of the college in effect at the time of his or her entrance to the program. He or she also must adhere to a degree plan approved by the student's adviser and the college's graduate committee. This includes a minimum of 45 credits although the total credits required for each individual usually exceeds 45. Completion of MMC 6400, 6421 and 6920 and an approved introductory course in statistics is required for each student. In addition, each student must complete 21 credits in courses of 5000 level or higher with prefixes of ADV, COM, FIL, JOU, MMC, PUR or RTV.

ADV 6503—Creative Advertising Strategy and Consumer Behavior (4) Findings of the social sciences as guides for decisions in creative advertising planning; effects of consumer behavior concepts in shaping advertising message content and improving media selection.
ADV 6504—Advertising Research Problems (4) Testing advertising appeals and efficiency, market analysis, consumer analysis.
ADV 6602—Advertising/Public Relations Management (4) Applications of management theory and practice to solving advertising and public relations problems through effective decision making.
COM 6315—Advanced Research Methods (4) *Prereq: MMC 6421 and STA 6166 or equivalent.* Scientific method, measurement, analysis.
COM 6940—Supervised Teaching (1-5; max: 5)
FIL 6101—Advanced Radio, Television, and Film Writing (4) *Prereq: consent of instructor.* Forms, techniques, and types of writing as they apply to radio, television, and film.

JOU 6112—Investigative Reporting (4) Writing investigative, interpretative, and editorial articles and columns; in-depth reporting.
JOU 6113—Urban Affairs Reporting (4) Instruction and practice in the developing and writing of in-depth newspaper stories dealing with problems of American cities.
JOU 6190—Seminar in Problems of News Gathering and Presentation (4) Internal problems of news media operation. Status of personnel, effects of technological developments, news decision making, defining objectivity, improving news coverage.
JOU 6501—Newspaper Production and Management (4) Newspaper business management, good will, budgets, accounting, labor problems, taxes, legal questions, postal regulations, newspaper promotion, circulation, advertising problems, weekly and small daily publishing.
JOU 6891—Seminar in Journalism Teaching (4) Research and training for journalism teaching and supervision of student publications.
JOU 6892—Seminar in Journalism as Literature (4) Analysis of mass media writing, broadcast programs, and graphics to assess their merits both as journalism and as art. Various periods studied, with emphasis on the 20th century.
MMC 6202—Seminar in Legal Problems of Mass Communication (4) Current problems confronting mass media in such areas as constitutional interpretation, conflicts between media and the rights of others, regulation, the nature of jurisprudence.
MMC 6303—International Communication I (4) Analysis and comparison of print and electronic communication systems among nations and cultures, barriers and stimuli to international communication, mass media in national development.
MMC 6304—International Communication II (4) *Prereq: MMC 6303.* Specialized or regional aspects of international communication; in-depth investigation by students of particular concepts and research literature presented in MMC 6303.
MMC 6400—Mass Communication Theory (4) Structure, content, process, effects of communication; contributions of other disciplines to knowledge about the process, e.g., semantics, linguistics, learning theory; barriers to effective communication; use of research concepts.
MMC 6421—Research Methods in Mass Communication (4) Introduction to experiments, surveys, content analysis; sampling and measurement. Laboratory applications.
MMC 6560—Seminar in History of Mass Communication (4) Reading, critical study, and advanced investigative report on an approved research subject.
MMC 6660—Seminar in Mass Communication and Society (4) Rights, responsibilities, ethics of communication media; government and communication media; economic, political, social determinants of the character and content of mass communication.
MMC 6905—Individual Work (1-5; max: 10) Reading or research course in areas of mass communication needed by graduate students.
MMC 6910—Supervised Research (1-5; max: 5)
MMC 6920—Communication Proseminar (1) Introduction to graduate study in the College of Journalism and Communications: procedures, resources, personnel. Required at beginning of each student's program.
MMC 6936—Special Topics in Mass Communication (2-5; max: 12) *Prereq: consent of instructor or graduate adviser.*
MMC 6971—Research for Master's Thesis (1-15)
PUR 6934—Problems in Public Relations (4) Specialized areas in public relations, case studies, community relations, analysis of public relations problems in the light of public relations and other communication theory.
RTV 5603—Teaching Through Television (4) Instructional television production and utilization; workshop, readings, and discussion sessions. Open to majors in media, College of Education; others by consent of instructor.
RTV 6503—Broadcast Program and Production Problems (4) Lecture and laboratory in planning and production of complex programs.
RTV 6601—Radio and Television in Education (4) The broadcast media in public school education and adult education; current usages in direct and indirect teaching and continuing education.
RTV 6801—Broadcast Station Management (4) Station organization, operational policies, market research, programming policy, network affiliation, federal and state regulations governing the broadcast industry, FFC procedures.

CENTER FOR LATIN AMERICAN STUDIES
College of Liberal Arts and Sciences

GRADUATE FACULTY 1979-80

Director: I. A. Schulman. *Associate Director & Graduate Coordinator:* T. L. McCoy. *Graduate Research Professors:* E. S. Deevey, Jr.; W. W. McPherson; I. A. Schulman; C. Wagley. *Professors:* G. A. Antonini; D. Bushnell; J. D. Casteel; R. C. Craven, Jr.; P. L. Doughty; M. W. Gordon; C. C. Goslinga; M. J. Hardman-de-Bautista; A. Hower; K. E. Kent; N. W. Macaulay; L. N. McAlister; D. L. Niddrie; R. N. Pierce; H. L. Popenoe; R. R. Renner; C. N. Smith; G. A. D. Soares; A. Suarez. *Associate Professors:* C. O. Andrew; G. B. Coulson; D. A. Denslow; J. K. Dow; J. J. Ewel; C. L. Hallman; A. E. Lugo; M. L. Margolis; T. L. McCoy; A. R. Oliver-Smith; T. A. Nunez; L. A. Paganini; J. R. Simpson; W. G. Tyler; S. J. Wilkerson. *Assistant Professors:* A. F. Burns; R. Garcia; H. Vera; C. H. Wood. *Associate Research Scholar:* F. M. Trueblood.

The Center for Latin American Studies offers the following programs in graduate studies: (1) an interdisciplinary Master of Arts degree, (2) a Certificate in Latin American Studies for master's and doctoral students in conjunction with disciplinary degrees in the graduate programs of the Colleges or Departments of Agricultural and Extension Education, Anthropology, Business Administration, Economics, Education, Food and Resource Economics, Geography, History, Political Science, Romance Languages (Spanish), and Sociology, (3) a Certificate in Latin American Demographic Studies, in a special program of Latin American demography, for master's and doctoral students in conjunction with the Departments of Geography, Sociology, and Economics.

The graduate program in Latin American Studies consists of 165 courses with Latin American content taught in the above departments. In cooperation with the Center for Tropical Agriculture, 64 additional courses with Latin American content taught in the Institute of Food and Agricultural Sciences may be accepted for credit toward meeting certain requirements for graduate certificates in Latin American studies.

A description of the several degree and certificate programs in Latin American studies may be found in the section *Special Programs.* Listings of courses other than those enumerated below may be found in individual departmental descriptions and the *Bulletin* of the Center for Latin American Studies. Copies of the *Bulletin* may be obtained from the Director, 319 Grinter Hall.

LAS 6905—Individual Work (3-5; max: 15) Reading or research in topics focusing on a Latin American area, but cutting across disciplines.
LAS 6938—Latin American Area Seminar (5; max: 15) *Prereq: Latin American area concentration.*
LAS 6971—Research for Master's Thesis (1-15)
LAW 6285—Latin American Legal Institutions Seminar (3) *Prereq: LAW 6935.* A general survey of the legal systems of the American Republics.

LAW 6286—Latin American Trade and Investment Seminar (3) *Prereq: LAW 6935.* Legal problems involved in trading with and formation and operation of business enterprises in Latin America.
LAW 6935—Law Seminar Preparation (1) *Prerequisite for each law seminar.*

LIBERAL ARTS AND SCIENCES—GENERAL
College of Liberal Arts and Sciences

OMT 6631—Scientist-in-the-Sea Training Program (12) *Prereq:* consent of *steering committee.* Blend of theoretical content and technical method to prepare advanced marine science students for underwater research. Includes topics in hyperbaric physiology and medicine, hyperbaric habitats and submersible vehicles, marine physical sciences, marine life sciences, psychological aspects of men-in-the-sea, underwater communication and navigation, diver technology, physical fitness and diving, and experimental application of course techniques.
SED 6943—Internship in College Teaching (3, 6, or multiples of 3, up to required total of 9) *Prereq: permission of graduate major department. Required of all candidates for the Master of Arts in Teaching and the Master of Science in Teaching degrees.*

LINGUISTICS
College of Liberal Arts and Sciences

GRADUATE FACULTY 1979-80

Director: C. C. Chu. *Graduate Coordinator:* R. M. Thompson. *Professors:* J. W. Conner; H. Der-Houssikian; C. J. Gellinek; J. C. Harder; M. J. Hardman-de-Bautista; H. Hollien; P. J. Jensen; N. N. Markel; R. J. Scholes. *Associate Professors:* J. Casagrande; C. C. Chu; D. Dew; P. A. Kotey; K. M. McCarthy; D. G. Miller; A. Paige; S. Y. Su; W. J. Sullivan, III; R. M. Thompson. *Assistant Professors:* T. Simon; R. de Beaugrande.

Linguistics draws its faculty from nine participating departments: Anthropology, Classics, English, Electrical Engineering, Germanic and Slavic Languages and Literatures, Humanities, Philosophy, Romance Languages and Literatures, and Speech. It offers a flexible program of study leading to the Ph.D. with a major in linguistics and two specializations at the M.A. level (1) general linguistics, and (2) teaching English as a second language (TESL).

Individualized doctoral programs may emphasize syntax, phonology, and linguistic change as either theoretical or descriptive constructs of one or more languages. A student may also work in any of the areas represented by the competence of the faculty.

Entering graduate students with deficiencies in general linguistics, structure of English, phonetics and phonemics must fulfill these basic prerequisites to graduate work. Students pursuing graduate degrees will be able to supplement the courses listed below with pertinent courses of linguistic content offered through related departments. For detailed information on requirements as well as opportunities for teaching and research assistantships or fellowships through Linguistics, please contact the Director, Program in Linguistics, 162 Grinter Hall.

ENG 6571—American Social Dialects (4) *Prereq: introductory linguistics course.* Language variations, especially in relation to the ethnic and racial boundaries of American society.
LIN 5715—Language Acquisition (5) Critical review of relevant theoretical and research literature.
LIN 6118—History of Linguistics (4) *Prereq: LIN 6222, 6322.* Linguistic thought from pre-Socratic to the 20th century.
LIN 6128—Historical Linguistics (4) *Prereq: LIN 6222, 6322.* Theory and methods of comparative historical linguistics.
LIN 6129—Studies in Linguistic Change (4; max: 12) *Prereq: LIN 6240, 6380, 6128.* Recent issues in historical linguistics.
LIN 6136—Principles of Linguistics (4) Basic theories of general linguistics, their methodologies, and their impact on current trends in linguistics.
LIN 6222—Introduction to Phonological Studies (4) *Prereq: LIN 6136.* Insights into the phonological levels of language. Features, contrast, markedness. Solving of problems from natural languages.
LIN 6240—Phonological Theory (4) *Prereq: LIN 6222.* Phonological analysis and construction of theoretical arguments.
LIN 6241—Studies in Phonology (4; max: 12) *Prereq: LIN 6240.* Recent issues in phonology.
LIN 6322—Introduction to Syntactic Studies (4) *Prereq: LIN 6136.* Insights into the grammatical level of language with problems from natural languages.
LIN 6377—Structure of a Specific Language (4) *Prereq: introductory linguistics course.* Linguistic examination of one of the following: Aymara, Arabic, Cakchiqual, Eskimo, Armenian, Chinese, Gã, Bulgarian, Polish, Swahili, Turkish, Twi.
LIN 6380—Syntactic Theory (4) *Prereq: LIN 6322.* Grammatical analysis and construction of theoretical arguments.
LIN 6381—Studies in Syntax and Semantics (4; max: 12) *Prereq: LIN 6380.* Recent issues in syntax and semantics.
LIN 6401—Contrastive Analysis (4) Theory of contrastive analysis and its application to second language acquisition.
LIN 6435—Gathering and Analysis of Linguistic Data (4) Basic techniques and problems of data collection and analysis from various sources.
LIN 6436—Seminar in Linguistic Field Methods (5; max: 15) *Prereq: LIN 6435.* Analysis of a particular language through an informant.
LIN 6600—Sociolinguistics (4) *Prereq: LIN 6222, 6387.* Language in its social context.
LIN 6622—Bilingualism in America (4) Psycholinguistic and sociolinguistic aspects of bilingualism, with implications for education.
LIN 6905—Individual Study (1-4; max: 30)
LIN 6910—Supervised Research (1-5)
LIN 6932—Special Topics (4; max: 36)
LIN 6940—Supervised Teaching (1-5)
LIN 6971—Research for Master's Thesis (1-15)
LIN 7980—Research for Doctoral Dissertation (1-15)
TSL 6371—Materials and Techniques for TESL (4) Review of theories of TESL teaching methods and materials. Instruction in classroom materials.
TSL 6375—TESL Observation and Analysis (2) *Prereq: TSL 6371.* Classroom procedures in teaching English as a second language observed in the English Language Institute. Seminar once a week for analytical discussions of classes observed.

MANAGEMENT
College of Business Administration

GRADUATE FACULTY 1979-80

Chairman: H. L. Tosi, Jr. *Graduate Coordinators:* A. Majthay; H. L. Reitz, Jr. *Graduate Research Professor:* I. Horowitz. *Professors:* H. R. Fogler; W. M. Fox; H. J. Reitz, Jr.; H. L. Tosi, Jr. *Associate Professors:* R. A. Elnicki; J. M. Feldman; J. H. James; G. J. Koehler; A. Majthay; J. W. Young. *Assistant Professor:* J. W. Hass.

The Department of Management offers the Master of Arts and the Doctor of Philosophy in business administration with specialization in management science, personnel management, and management. The Master of Business Administration degree is also offered with a major in management.

In general, graduate students can pursue either a quantitative or behaviorally oriented management program or some combination of the two. Each student's program is designed to reflect his or her individual needs and interests.

For admission to courses numbered 6000 and above, the student must have been admitted to the Graduate School and normally should have had undergraduate courses in fields pertinent to the graduate courses selected; where necessary, special arrangements may be made with the approval of the department chairman.

MAN 5205—Foundations of Management and Organizational Behavior (4) Fundamentals of the managerial process and organizational behavior.
MAN 6051—Managerial Planning (4) Managerial functions of planning. Requirements and complexities of corporate planning activity. Development of the theoretical basis of the planning process.
MAN 6107—Motivation in Organizational Settings (4) *Prereq: MAN 6108 or equivalent and consent of instructor.* Theory and research on motivational processes relevant to, and applied to, individual human behavior in complex organizations.
MAN 6108—Concepts and Methods in the Behavioral Sciences (5) *Prereq: MAN 3151.* Application of methodology and empirical findings from the behavioral sciences to business policies and practices.
MAN 6205—Theory and Skills of Organization Development (4) *Prereq: MAN 6108 or equivalent and consent of instructor.* Dual focus on (1) theory and research on the planning of change in complex organizations, and (2) laboratory practice in building intervention used by change agents.
MAN 6206—Organizational Behavior: Theory and Practice II (4) *Prereq: MAN 6108.* Consideration of method and theory in the study of human behavior in organizational contexts. Focuses on individual motivation and the organizational environment.
MAN 6207—Organizational Behavior: Theory and Practice I (4) *Prereq: MAN 6108.* Consideration of method and theory in the study of human behavior in organizational contexts. Focuses on individual motivation and the organizational environment.
MAN 6321—Personnel Techniques and Administration (4) *Prereq: MAN 4310.* Realistic cases which point up organizational human relations, and administrative problems of personnel administrator.
MAN 6421—Problems in Collective Bargaining (4) History, present status, and trends of collective bargaining, with an analysis of its economic, social, and legal aspects.
MAN 6511—Production Management Problems (5) Problems in the management of industrial enterprise; management principles and mathematical analysis applied to manufacturing; product development and production, materials and production control; employee relations.
MAN 6905—Individual Work in Management (1-5; max: 10) *Prereq: consent of department and Director of Graduate Studies.* Reading and/or research in management.
MAN 6910—Supervised Research (1-5)
MAN 6931—Special Topics in Management (4) *Prereq: consent of department well in advance of registration.* Topics more specialized or advanced than regularly listed courses.
MAN 6933—Seminar in Management (4) *Prereq: MAN 6051, 6207.* Historical foundations and evolutionary development of management concepts; comparative analysis of management patterns; emerging problems of management interest.
MAN 6940—Supervised Teaching (1-5)
MAN 6971—Research for Master's Thesis (1-15)
MAN 7925—Workshop in Management (3; max: 12) *Required of all doctoral candidates in management. Prereq: GEB 6757, MAN 5205, 6108, STA 6357 or equivalent.* Readings and research in management. Each student must present a research project for discussion and comment.
MAN 7980—Research for Doctoral Dissertation (1-15)
QMB 6607—Decision Processes Under Uncertainty (5) *Prereq: STA 4321, 4322.* Introduction to statistical decision theory, including the vonNeumann-Morgenstern behavioral axioms, forms, techniques for assessing probabilities, and penalty functions, with managerial and economics applications.
QMB 6697—Optimization in Simulation Modeling (3) *Prereq: QMB 4703.* Use of simulation techniques in managerial decision problems, including random number generation, and search procedures for determining optimal policies.
QMB 6808—Markov Decision Processes (4) *Prereq: STA 4321.* Application of Markov processes for managerial decisions, including probability estimation problems, and transition reward structures.
QMB 6809—Decision Processes Under Conflict (3) *Prereq: GEB 6757.* Managerial and economics applications of game theory models, including conflict resolution, bargaining, risk sharing, and group decision processes in a managerial context.
QMB 6827—Linear Programming for Management Scientists (3) *Prereq: GEB 6757.* Solving a linear programming model; evaluation of the solution, and linear programming computer software and its use.
QMB 6837—Graphs and Networks in Managerial Decision Models (1) *Prereq: GEB 6757.* Introduction to the theory of graphs and networks, computational aspects, and managerial and economics applications.
QMB 6857—Optimization in Static Managerial Models (4) *Prereq: GEB 6757.* Introduction to the theory and application of unconstrained and constrained optimization in static managerial decision models.
QMB 6865—Optimization in Dynamic Managerial Decision Models (4) *Prereq: QMB 6857.* Introduction to the theory of dynamic optimization in discrete-time and continuous-time models, with managerial and economics applications.
QMB 6877—Optimization in Discrete Managerial Decisions (2) *Prereq: GEB 6757.* Introduction to the theory of discrete optimization, and the basic ideas and tools of an exact solution method and successful heuristic methods, with managerial and economics applications.

MARKETING
College of Business Administration

GRADUATE FACULTY 1979-80

Chairman: J. B. Cohen. *Graduate Coordinator:* D. Chakravarti. *Professors:* G. G. Bechtel; J. B. Cohen; J. H. Faricy; R. B. Thompson; W. L. Wilkie. *Associate Professor:* A. R. Wildt. *Assistant Professors:* O. T. Ahtola; A. A. Anderson; D. Chakravarti; S. A. LaTour; E. T. Popper.

The Department of Marketing offers a specialization within the Master of Arts program in business administration, a concentration in the nonthesis Master of Business Administration degree program, and both a major and a minor field in the Doctor of Philosophy degree in business administration. No graduate major may be completed without adequate course work on the 6000 or higher level.

For admission to the courses listed below, the student must have been admitted to the Graduate School and normally should have had undergraduate courses in fields pertinent to the graduate courses selected; or, where necessary, special arrangements may be made with the approval of the department chairman.

For additional courses, please consult the *Business Administration-General* listing.

MAR 5055—Marketing Principles and Institutions (4) *Primarily designed for MBA candidates who lack adequate preparation in marketing.* Descriptive and analytical approach to the study of marketing institutions and functions.
MAR 6246—International Marketing (5) *Prereq: MAR 6716.* Strategies leading to the penetration of foreign markets.
MAR 6506—Consumer Behavior (5) Theory and research in

the behavioral and social sciences applied to individual and aggregate behavior of consumers.

MAR 6516—Public Policy Research in Marketing (5) *Prereq: MAR 6506 and 6616 or equivalents, or consent of instructor.* Analysis of regulatory and other public policy programs involving marketing practices which impact on the consumer. Emphasis on role of consumer research in resolution of public policy issues.

MAR 6606—Quantitative Analysis for Marketing Decisions (5) *Prereq: MAR 6716, MAN 5511, GEB 5805, and STA 6358 or 6167.* Application of management science concepts and techniques to the solution of marketing decision making problems.

MAR 6616—Seminar in Marketing Research (5) *Prereq: MAR 6716 and STA 6358.* Examination of approaches and methods of marketing research with particular attention given to the perspective of the marketing manager.

MAR 6635—Research Issues in Marketing (5) *Prereq: MAR 6716 or equivalent and consent of Instructor.* An intensive analysis of the marketing functions with emphasis on the role that research plays in capturing environmental constraints. Course stresses research approaches to marketing decisions relative to functions.

MAR 6717—Seminar in Marketing Management (5) *Prereq: MAR 6716.* Advanced case course dealing with the wide range of strategic problems faced by the marketing manager.

MAR 6806—Seminar in Marketing Theory (5) *Prereq: MAR 6716 or equivalent and consent of instructor. Intended only for students in M.A. and Ph.D. programs.* Advanced principles, theories, and problems in marketing. Functional and historical approaches stressing the scope and evolution of the field.

MAR 6905—Individual Work (1-5; max: 10) *Prereq: Consent of department.* Reading and/or research in marketing.

MAR 6910—Supervised Research (1-5)

MAR 6933—Special Topics in Marketing (5) *Prereq: Consent of department.* Selected topics in marketing management, research or theory.

MAR 6940—Supervised Teaching (1-5)

MAR 6971—Research for Master's Thesis (1-15)

MAR 7507—Perspectives in Consumer Behavior (5) *Prereq: MAR 6506 or equivalent.* An in-depth analysis of the field of consumer behavior. Variety of theoretical and methodological approaches will be critically examined through the study of the marketing literature.

MAR 7518—Consumer Information Processing and Decision Making (5) *Prereq: STA 6167 or 6358 and 4 graduate credits in consumer behavior or social psychology.* Behavioral and statistical concepts applied to the study of consumer decision making and to the development of models of buyer behavior.

MAR 7622—Design of Marketing Research (5) *Prereq: STA 6166, 6167, and MAN 6108 or equivalent, and consent of instructor.* Approaches and philosophies of research in marketing. Detailed exposure to the design, execution, analysis, and interpretation of experiments in marketing and consumer research.

MAR 7625—Advanced Statistical Analysis in Marketing Research (5) *Prereq: STA 6167 or equivalent and introduction to calculus and matrix algebra.* Introduction to and application in marketing research of advanced statistical techniques. Course considers theory and assumptions of analysis methods, review of selected marketing applications, use of computer programs in applying the techniques and the interpretation of the results.

MAR 7627—Subjective Measurement in Marketing and Survey Research (5) *Prereq: STA 6167 or equivalent and consent of instructor.* Survey research design; unidimensional measurement including questionnaire methods, reliability, validity, comparative and categorical judgment; multidimensional scaling of consumer perception and preference.

MAR 7628—Multidimensional Scaling for Market and Societal Analysis (5) *Prereq: STA 6167 or equivalent and fundamentals of matrix algebra.* Derivation of utilities from preferential choices; measurement of spatial attributes underlying utility; principal components and distance decompositions; scaling categorical judgments in survey research.

MAR 7639—Workshop in Marketing Research (4; max: 12) *Prereq: MAR 6616 or equivalent, or consent of instructor.* In-depth analysis of current research topics in marketing. Emphasis on research programs of leading scholars in the field. Students critically appraise the rationale, strengths, and weaknesses of each study.

MAR 7980—Research for Doctoral Dissertation (1-15)

MATERIALS SCIENCE AND ENGINEERING
College of Engineering

GRADUATE FACULTY 1979-80

Chairman: E. D. Verink, Jr. *Graduate Coordinator:* R. E. Reed-Hill. *Distinguished Service Professor Emeritus:* F. N. Rhines. *Professors:* R. T. DeHoff; E. P. Goldberg; R. W. Gould; A. G. Guy; C. S. Hartley; L. L. Hench; J. J. Hren; R. E. Hummel; J. Kronsbein *(Emeritus)* ; H. A. Mohammed; G. Y. Onoda, Jr.; R. E. Reed-Hill; E. D. Verink, Jr.; E. D. Whitney. *Associate Professors:* J. R. Ambrose; P. H. Holloway. *Assistant Professors:* A. E. Clark, Jr.; R. G. Connell, Jr.; F. J. Schoen.

The Department of Materials Science and Engineering offers the Master of Science, Master of Engineering, Doctor of Philosophy, and the Engineer degree. Degrees may be obtained with specialization in metals and alloys, ceramic, and polymeric materials.

Specific areas of concentration within the department include biomaterials, corrosion, diffusion, mechanical behavior, quantitative microscopy, mineral processing, reaction kinetics in the solid state, and structural analysis.

The minimum requirement for admission to the program is a bachelor's degree in materials science and engineering or in a related field. Graduate students who can present the prerequisites for graduate courses without having to take more than 18 credits in advanced undergraduate courses will be considered to have fulfilled this requirement.

CHM 5272—The Organic Chemistry of Polymers (3) Classification of polymerization types and mechanisms from a mechanistic, organic point of view. The structure of synthetic and natural polymers and polyelectrolytes. Reactions of polymers. Practical synthetic methods of polymer preparation.

CHM 5511—The Physics and Physical Chemistry of Polymers (3) The structure, configuration, conformation, and thermodynamics of polymer solutions, gels, and solids. Mechanical, optical, and rheological properties of plastics and rubbers. Demonstration of experimental methods.

EMA 6106—Advanced Phase Diagrams I (3) Phase diagrams considering systems with as many as four components; emphasis on pressure-temperature-composition diagrams.

EMA 6107—Advanced Phase Diagrams II (3) *Prereq: EMA 6106.*

EMA 6110—Electron Theory of Solids for Materials Scientists I (4) Wave equation and its application to free electrons, bound electrons, and electrons in crystals. Electron-band theory and its applications. Electrical properties of metals, alloys and semiconductors, heat capacity, thermal properties.

EMA 6111—Electron Theory of Solids for Materials Scientists II (4) Atomistic (classical) and electron theory of the optical properties of metals, alloys, and dielectrics. Nonlinear optics, lasers, Raman-spectra.

EMA 6112—Electron Theory of Solids for Materials Scientists III (4) Electron theory of magnetism, magnetic properties and their relationship to microstructure (para-, dia-, ferro-, antiferro-, ferri- and metamagnetism). Superconductors.

EMA 6126—Advanced Physical Metallurgy I (4) *Prereq: EMA 4125.* Energetics of phase transformations; spinodal decomposition, heterogeneous and homogeneous nucleation in solid state reactions.

EMA 6127—Advanced Physical Metallurgy II (4) *Prereq: EMA 6126.* Growth and dissolution of particles in solids; cellular

growth; coarsening; martensite transformations; sintering and other solid state processes.

EMA 6128—Advanced Physical Metallurgy III (4) *Prereq: EMA 4125.* Annealing processes and their relation to the cold worked state, including recovery, recrystallization, and grain growth.

EMA 6136—Diffusion in Solids (3) *Prereq: EMA 4124.* Physical basis, equations, and theories of diffusion, tracer, chemical, multicomponent, and multiphase diffusion in general force fields.

EMA 6137—Radiation Damage in Solids (3) Action of thermal neutrons and fast particles upon solids, property changes by irradiation in pure metals and alloys, irradiation effects in semiconductors and ionic crystals; radiation phenomena in quartz, insulators, electronic devices, and fissionable materials.

EMA 6146—Atomic Processes in Crystalline Ceramics (4) Processes leading to the control of thermal and mechanical properties of ceramics through microstructure. High temperature reactions involving solids, diffusion, grain growth, and phase transformations in ceramic systems. Sintering phenomena.

EMA 6147—Structure and Properties of Glasses (4) Theory of glass structure, phase separation, nucleation, crystallization, glass-ceramics. Influence of composition, structure, and environment on physical and surface properties.

EMA 6226—Advanced Mechanical Metallurgy I (4) *Prereq: EMA 4223.* Theory of elasticity; advanced theory of plasticity; theory and properties of dislocations; dislocation motion and interactions; application to deformation processes; survey of recent advances in the field.

EMA 6227—Advanced Mechanical Metallurgy II (4) Continuum theory of dislocation. Stress fields, displacement fields, energies of simple shapes and finite arrays of dislocations. Continuous distributions of dislocations and their relationship to mechanical properties. Relation of the state of dislocation to the geometry of deformed lattices.

EMA 6316—Metallurgical Thermodynamics (3) *Prereq: EMA 4314.* Thermodynamics of metallurgical systems; surfaces in solids, irreversible processes.

EMA 6326—Advanced Topics on Corrosion (3) *Prereq: EMA 4324.* Theories and mechanisms of corrosion. Current literature on oxidation and corrosion.

EMA 6436—Optical Instruments in Materials Research (3) Methods for determining optical constants of metals (ellipsometry). Reflectivity, optical thickness measurements, infrared spectrometer, sensitive tint, polarizing microscope, differential reflectometer, optical stress analysis, polarizers, analyzers and light sources.

EMA 6437—Growth, Structure and Properties of Thin Films (3) Preparative techniques, structural characteristics and electronic properties of metallic, semiconducting, and dielectric films.

EMA 6446—Electronic Processes in Crystalline Ceramics (4) *Prereq: EMA 4444 or consent of instructor.* The defect solid state and its relation to electrical properties of ceramic materials. Ionic conductivity in ceramics. Solid electrolytes. Theory of electron transport in metallic, semiconducting, and insulating ceramics.

EMA 6448—Ceramic Processing (4) Introduction to the science of ceramic processing, with emphasis on theoretical fundamentals. Examples of state-of-the-art industrial processes discussed.

EMA 6507C—Scanning Electron Microscopy and Electron Probe Microanalysis (4) *Prereq: EMA 4223.* Fundamentals of scanning electron microscopy and electron probe microanalysis. Laboratory.

EMA 6508—Quantitative Microscopy (3) Fundamental relationships of quantitative microscopy and their application to microstructural characterization; designing and testing models for microstructural evolution.

EMA 6514L—X-Ray Spectrochemical Analysis (4) *Prereq: EMA 4224 or consent of instructor.* Application of x-ray spectrochemical analysis to problems in metallurgy, ceramics and biomaterials.

EMA 6516—Advanced X-Ray Diffraction I (4) *Prereq: EMA 4524.* Kinematic x-ray diffraction theory and applications to materials analysis.

EMA 6517—Advanced X-Ray Diffraction II (3) *Prereq: EMA 6516.*

EMA 6518L—Transmission Electron Microscopy (4) *Prereq: EMA 4524.* Kinematical and dynamical theory of contrast in thin crystals. Laboratory studies, defect structure, applications to electron diffraction. Laboratory included.

EMA 6519L—Specialized Research Techniques in Materials Science (1-3; max: 15) Specialized research techniques in materials science utilizing primarily STEM, TEM, SEM, EMP, FIM, and optical metallography.

EMA 6580—Science of Biomaterials I (3) *Undergraduate chemistry essential.* Introduction to variables that control compatibility and performance of biomaterials, including physical and chemical properties, corrosion, fatigue, and interfacial histochemical changes.

EMA 6581—Science of Biomaterials II (3) *Undergraduate chemistry essential.* Anatomical variables, stresses, materials selection, and selected literature readings.

EMA 6905—Individual Work in Materials Science and Engineering (1-6; max: 12)

EMA 6910—Supervised Research (1-5)

EMA 6936—Seminar in Materials Science and Engineering (1) S/U.

EMA 6937—Seminar in Metallurgy and Ceramic Science (1-2)

EMA 6938—Special Topics in Materials Science and Engineering (1-6; max: 9)

EMA 6940—Supervised Teaching (1-5)

EMA 6971—Research for Master's Thesis (1-15)

EMA 7008—Product Liability: Effective Use of Engineering Experts (3) *Available for credit toward graduation in the College of Law.* Basic engineering concepts underlying product failure and safety, causal relationships, proof of negligence and standards of care. No engineering background required.

EMA 7980—Research for Doctoral Dissertation (1-15)

MATHEMATICS
College of Liberal Arts and Sciences

GRADUATE FACULTY 1979-80

Chairman: A. R. Bednarek. *Associate Chairman:* Z. R. Pop-Stojanovic. *Graduate Coordinator:* L. Block. *Graduate Research Professors:* R. E. Kalman; S. M. Ulam. *Professors:* A. R. Bednarek; J. K. Brooks; N. Dinculeanu; R. R. Kallman; J. E. Keesling; C. W. Nelson; V. M. Popov; Z. R. Pop-Stojanovic; A. K. Varma. *Associate Professors:* P. Bacon; L. S. Block; B. L. Brechner; D. A. Cenzer; S. S. Chen; D. A. Drake; M. P. Hale, Jr.; J. A. Larson; R. L. Long; C. P. Luehr; J. Martinez; T. O. Moore; G. X. Ritter; S. A. Saxon; K. N. Sigmon; M. L. Teply; T. Walsh; D. C. Wilson. *Assistant Professors:* B. Baird; D. K. Blevins; T. T. Bowman; C. A. Burnap; B. H. Edwards; K. B. Farmer; G. A. Ritter; N. L. White; S. E. Zarantonello.

The Department of Mathematics offers the degrees of Doctor of Philosophy, Master of Science, and Master of Arts, and the Master of Arts in Teaching and Master of Science in Teaching, each with a major in mathematics.

There are opportunities for concentrated study in a number of specific areas at both the master's and doctoral levels. Competent faculty directs studies and research in algebra, number theory, analysis, geometry, topology, logic, differential equations, control theory, probability theory, mathematical systems theory, numerical analysis, approximation theory, combinatorial analysis, graph theory, computer applications, mathematical physics, and biomathematics.

In addition to the requirements of the Graduate School, the minimum prerequisite for admission to the program of graduate studies in mathematics is the completion, with an average grade of B or better, of at

least 36 credits of undergraduate mathematics, including a full year of calculus and three quarters of appropriate work beyond the calculus. Students lacking part of the requirements will be required to make up the deficiency early in their graduate work.

Prerequisites to individual courses should be determined before registration by consultation with the instructor concerned through the departmental office.

Some of the courses listed are offered only as needed. Since times for offering courses are estimated a year in advance, certain changes may be made if needs are known by the department.

The Courses MAA 5226, 5227, 5228, MAS 5331, 5332, and 5333 are required for all advanced degree programs in mathematics.

The requirements for the master's degree are 48 hours of course work, at least 27 hours of which are 6000-level courses in mathematics. If a thesis is written, up to nine hours of MAT 6971 may count toward these hour requirements. A comprehensive written examination is required of all master's students.

The requirement for a doctoral degree is at least 54 hours of 6000-level course work in mathematics. No hours of teaching, colloquium, thesis, or individual work will count toward this requirement.

The doctoral student must pass a written and oral comprehensive preliminary examination administered by the department to become a candidate for the degree. The doctoral student must pass reading knowledge examinations in two of the following foreign languages: French, German, or Russian.

The dissertation is an important requirement for the doctoral degree in mathematics. The topic for the dissertation may be chosen from a number of areas of current research in pure and applied mathematics.

Every graduate student is expected to attend the regular colloquium.

Details concerning all requirements for graduate degrees in mathematics can be obtained by writing the Mathematics Department Graduate Selection Committee.

MAA 5102—Advanced Calculus I (3)
MAA 5103—Advanced Calculus II (3)
MAA 5104—Advanced Calculus III (3)
MAA 5226—Modern Analysis I (3) *Prereq: MAC 3313.* Topology of metric spaces, numerical sequences and series, continuity, differentiation, the Riemann-Stieltjes integral, sequences and series of functions, the Stone-Weierstrass theorem, functions of several variables. Stokes' theorem, the Lebesgue theory.
MAA 5227—Modern Analysis II (3) *Prereq: MAA 5226.*
MAA 5228—Modern Analysis III (3) *Prereq: MAA 5227.*
MAA 5402—Introduction to Complex Variables for Engineers and Physical Scientists (4)
MAA 5506—Introduction to Functional Analysis I (4)
MAA 5507—Introduction to Functional Analysis II (4)
MAA 6236—Mathematical Analysis for Statisticians (4) *Coreq: STA 6326.* Set theory, cardinality, metric spaces, limits, continuity, differentiation, approximation of functions, series of functions. Applications to probability and statistics stressed.
MAA 6237—Mathematical Analysis for Statisticians (4) *Prereq: MAA 6236.* Measure and integration; additive set functions and measures; Lebesgue measure in R^n, Egorov's theorem. Lebesgue and Lebesgue-Stieltjes integrals, monotone convergence, dominated convergence. L^p spaces, Radon-Nikodym theorem, Fubini theorem, and Kolmogorov-Daniell theorems. Applications in probability and statistics.
MAA 6238—Mathematical Analysis for Statisticians (4) *Prereq: MAA 6237.* Matrix theory; algebraic requirements for experimental designs, distribution theory and Markov processes. Fourier series; convergence results. Gibbs phenomenon, relation to time series. Characteristic functions; continuity, differentiability conditions, Helley's theorems, examples.
MAA 6406—Complex Analysis I (3) *Prereq: MAA 5228.* Rapid survey of properties of complex numbers, linear transformations, geometric forms and necessary concepts from topology. Complex integration, Cauchy's theorem and its corollaries. Taylor's series and the implicit function theorem in complex form. Conformality and the Riemann-Carathedory mapping theorem. Theorems of Bloch, Schottky and the big and little theorems of Picard. Harmonicity and Dirichlet's problems.
MAA 6407—Complex Analysis II (3) *Prereq: MAA 6406.*
MAA 6408—Complex Analysis III (3) *Prereq: MAA 6407.*
MAA 6616—General Theory of Measure and Integration I (3) *Prereq: MAA 5228.* The Daniell approach to integration, abstract measure theory, abstract Lebesgue integral, convergence theorems for integrals, Riesz representation theorem. L^p spaces, various modes of convergence. Banach spaces, Hahn-Banach theorem, open-mapping theorem, uniform-boundedness principle. Hilbert spaces, differentiation of functions of one real variable, Vitali's covering theorem, differentiability of monotone functions, absolutely continuous functions and indefinite integrals, the Lebesgue-Radon-Nikodym theorem.
MAA 6617—General Theory of Measure and Integration II (3) *Prereq: MAA 6616.*
MAA 6618—General Theory of Measure and Integration III (3) *Prereq: MAA 6617.*
MAA 6626—Advanced Topics in Integration I (3) *Prereq: MAA 6618 and MTG 6348.* Current topics in integration, reference to function spaces and to spaces provided with algebraic or topological structures.
MAA 6627—Advanced Topics in Integration II (3) *Prereq: MAA 6626.*
MAA 6628—Advanced Topics in Integration III (3) *Prereq: MAA 6627.*
MAA 7526—Advanced Topics in Functional Analysis I (3; max: 6) *Prereq: MAA 6618, MAS 6348.* Algebraic and topological approach to material and methods current in analysis.
MAA 7527—Advanced Topics in Functional Analysis II (3; max: 6) *Prereq: MAA 7526.*
MAA 7528—Advanced Topics in Functional Analysis III (3; max: 6) *Prereq: MAA 7527.*
MAD 5306—Theory of Graphs I (4)
MAD 5307—Theory of Graphs II (4)
MAD 5405—Numerical Methods of Differential Equations (4) Discrete and variational methods (numerical) for the solution of ordinary and partial differential equations.
MAD 6206—Combinatorial Theory I (3) Matching theory, Ramsey's theorem, lattice theory, Mobius inversion, generating functions, Polya's theorem, combinatorial geometries (or matroids) applications.
MAD 6207—Combinatorial Theory II (3)
MAD 6208—Combinatorial Theory III (3)
MAD 6407—Numerical Analysis (4) *Prereq: MAA 4212, 5228 or MAD 4401.* Designed to acquaint research students with numerical analysis, error analysis of differential equations, integral equations, eigenvalue, and matrix problems with study of errors.
MAE 6940—Supervised Teaching (1-5)
MAP 5304—Intermediate Differential Equations for Engineers and Physical Scientists (3)
MAP 5345—Introduction to Partial Differential Equations (3)
MAP 5423—Introduction to Operational Calculus (3)
MAP 5484—Mathematics for Biological Sciences I (3) *Prereq: MAC 3311.* Difference equations, differential equations, probability theory, matrix theory, and Markov chains with applications in the biological sciences. Among the applications covered are population dynamics, epidemiology, and genetics.
MAP 5485—Mathematics for Biological Sciences II (3) *Prereq: MAP 5484.* Continuation of MAP 5484.
MAP 5486—Mathematics for Biological Sciences III (3) *Prereq: MAP 5485.* Continuation of MAP 5485.
MAP 6216—Introduction to Calculus of Variations for Engineers and Physical Scientists (3) *Prereq: MAP 5304, MAS 5156*

or equivalent. Extremum problems, first variation. Euler equation, problems with fixed and movable boundaries. Lagrange multiplier methods for problems with constraints, canonical form, second variation, applications to physics and engineering.

MAP 6356—Partial Differential Equations I (3) *Prereq: MAA 5228, MAP 5341 or 6507.* Cauchy-Kowalewski theorem, first order equations, classification of equations, hyperbolic equations, elliptic equations, parabolic equations, hyperbolic systems, nonlinear hyperbolic systems, existence theory based on functional analysis. Applications to physical sciences.

MAP 6357—Partial Differential Equations II (3)

MAP 6358—Partial Differential Equations III (3)

MAP 6417—Fourier Series I (3) *Prereq: MAP 6505.* Fundamental theorems on convergence, differentiation, and integration. Applications to boundary value problems.

MAP 6418—Fourier Series II (3) *Prereq: MAP 6417.*

MAP 6467—Stochastic Differential Equations and Filtering Theory I (3) Introduction to random functions; the Brownian motion process. Ito's stochastic integral; Ito's stochastic calculus; stochastic differential equations. Linear filtering; Kalman filtering; nonlinear filtering theory.

MAP 6468—Stochastic Differential Equations and Filtering Theory II (3) *Prereq: MAP 6467.*

MAP 6469—Stochastic Differential Equations and Filtering Theory III (3) *Prereq: MAP 6468.*

MAP 6472—Probability and Potential Theory (3) *Prereq: MAA 5226, 5227, 5228, STA 6326.* Probability Laws. Uniformly integrable random variables. Independence and conditioning. General properties of stochastic processes. First and second canonical process. Separability of stochastic processes. Decompositions. Potentials. Excessive functions. Connections with Martingale theory.

MAP 6473—Probability and Potential Theory (3) *Prereq: MAA 5226, 5227, 5228, STA 6326.*

MAP 6474—Probability and Potential Theory (3) *Prereq: MAA 5226, 5227, 5228, STA 6326.*

MAP 6487—Biomathematics Seminar I (3) *Prereq: MAC 3311, 3312, MAP 3302, STA 6326, STA 6327.* Stochastic processes, differential equations, and catastrophe theory used to model various biological processes. Among the applications covered are the following: population dynamics, epidemiology, genetics enzyme kinetics, cell differentiation and morphogenesis, nerve impulse generation, and aggregation of slime mold. The course is designed to benefit graduate students in biological sciences, as well as mathematics.

MAP 6488—Biomathematics Seminar II (3) *Prereq: MAP 6780.* Continuation of MAP 6487.

MAP 6489—Biomathematics Seminar III (3) *Prereq: MAP 6781.* Continuation of MAP 6488.

MAP 6505—Mathematical Methods of Physics and Engineering I (3) *Prereq: MAA 5402, MAP 5304, 5345, MAS 5156 or equivalent.* Orthogonal functions; theory of distributions; integral equations; eigenfunctions and Green's functions; special functions; boundary and initial value problems, with emphasis on potential theory (Laplace and Poisson equations); the wave equation; and the diffusion equation.

MAP 6506—Mathematical Methods of Physics and Engineering II (3)

MAP 6507—Mathematical Methods of Physics and Engineering III (3)

MAP 7436—Seminar in Applied Mathematics I (3; max: 6) Various topics in applications of mathematics both classical and in areas of current research.

MAP 7437—Seminar in Applied Mathematics II (3; max: 6)

MAP 7438—Seminar in Applied Mathematics III (3; max: 6)

MAP 7475—Seminar in Mathematical System Theory (3) *Prereq: admission to doctoral study.* Critical review of current developments in system theory, with strong emphasis on (but not limited to) questions of mathematical interest. Presentations by invited speakers as well as by students and faculty affiliated with the Center for Mathematical System Theory. Intensive discussions by participants rather than ex cathedra lectures. May be repeated.

MAP 7477—Introduction to Mathematical System Theory I (4) *Required for doctoral work in system theory. Prereq: consent of instructor.* Fundamental mathematical structures in the description of dynamical systems, especially linear system and finite automata. Problems of controllability, observability, structure, and identification. Topics to reflect current developments. H.

MAP 7478—Introduction to Mathematical System Theory II (4) May be repeated.

MAS 5156—Vector Analysis (3)

MAS 5331—Introductory Algebra I (3) *Prereq: MAS 4103 or 4312.* The basic algebraic systems: groups, rings, vector spaces and modules. Linear transformations, matrices, and determinants, the Galois theory.

MAS 5332—Introductory Algebra II (3) *Prereq: MAS 5331.*

MAS 5333—Introductory Algebra III (3) *Prereq: MAS 5332.*

MAS 5334—Rings, Modules and Linear Algebra (4) *Prereq: undergraduate linear algebra.* Structure of principal ideal domains and their modules, with application to abelian groups and linear transformations.

MAS 6158—Tensor Analysis (3) *Prereq: MAS 5156 or equivalent.* Tensor algebra, tensor calculus, covariant differentiation. Riemannian spaces, curvature tensor, the Ricci and Einstein tensors, geodesics, parallel displacement; applications to differential geometry, physics, and engineering.

MAS 6329—Applications of Group Theory in the Physical Sciences (3) *Prereq: PHS 6225.* Group theory, the theory of representations of groups and their relationship to the problems of physics.

MAS 6346—Algebra I (3) *Prereq: MAS 5333.* Sylow theorems, solvable and nilpotent groups, Jordan-Holder theorem, abelian groups, Jacobson radical, Jacobson density theorem, Wedderburn-Artin theorem.

MAS 6347—Algebra II (3) *Prereq: MAS 6346.*

MAS 6348—Algebra III (3) *Prereq: MAS 6347.*

MAS 7215—Theory of Numbers I (3) *Prereq: 2 of MAA 6408, 6618, MAS 6348.* Introduction to the theory of numbers; theorems on divisibility; congruences, number-theoretic functions; primitive roots and indices; the quadratic reciprocity law; Diophantine equations and continued functions.

MAS 7216—Theory of Numbers II (3) *Prereq: MAS 7215.*

MAS 7217—Theory of Numbers III (3) *Prereq: MAS 7216.*

MAS 7396—Advanced Topics in Algebra I (3; max: 6) *Prereq: MAA 6408, 6618, MAS 6348 or MTG 6348.* Current topics in algebra.

MAS 7397—Advanced Topics in Algebra II (3; max: 6) *Prereq: MAS 7396.*

MAS 7398—Advanced Topics in Algebra III (3; max: 6) *Prereq: MAS 7397.*

MAT 6905—Individual Work (3; max: 12)

MAT 6910—Supervised Research (1-5)

MAT 6932—Special Topics in Mathematics (3) *Prereq: consent of graduate adviser, who should be consulted well in advance of registration.*

MAT 6971—Research for Master's Thesis (1-15)

MAT 7980—Research for Doctoral Dissertation (1-15)

MHF 5107—Introduction to Set Theory (4) Basic axioms and concepts of set theory, axiom of choice, Zorn's lemma, Schroder-Bernstein theorem, cardinal numbers, ordinal numbers, and the continuum hypothesis.

MHF 6306—Mathematical Logic I (3) Languages, models, and theories; Godel's completeness and incompleteness theorems; formal number theory and axiomatic set theory; applications to other areas of mathematics.

MHF 6307—Mathematical Logic II (3) *Prereq: MHF 6306.*

MHF 6308—Mathematical Logic III (3) *Prereq: MHF 6307.*

MTG 5316—Introduction to Topology I (4) Basic axioms and concepts of point-set topology, compactness, connectedness, separation axioms, metric spaces, metrization, Tietze extension theorem. Urysohn lemma, Tychonoff theorem.

MTG 5317—Introduction to Topology II (4)

MTG 6227—Incidence Geometry I (3) *Prereq: MTG 6237 or consent of instructor.* Latin squares, nets, designs, partial designs, Hjelmslev planes, Bruck-Ryser-Chowla theorem, Hall multiplier theorem, Bose-Shrikhande-Parker theorem.

MTG 6228—Incidence Geometry II (3) *Prereq: MTG 6227 or consent of instructor.*

MTG 6237—Projective Geometry (3) Projective and affine planes, coordinatization theorems, central collineations, the Desarguesian configuration, K-arcs and ovals, translation planes, quasifields (group) congruences, Moufang planes, isotopis, derivation.

MTG 6256—Differential Geometry I (3) *Prereq: MAS 5156 or*

equivalent. First part of a three-term sequence. Classical differential geometry of curves and surfaces, differentiable manifolds, tensor analysis, affine connection, Riemannian geometry. Lie groups, Lie algebras, applications to physics.
MTG 6257—Differential Geometry II (3) *Prereq: MTG 6256.*
MTG 6258—Differential Geometry III (3) *Prereq: MTG 6257.*
MTG 6266—Introduction to Commutative Algebra and Algebraic Geometry I (3)
MTG 6267—Introduction to Commutative Algebra and Algebraic Geometry II (3)
MTG 6268—Introduction to Commutative Algebra and Algebraic Geometry III (3)
MTG 6276—Theory of Convexity I (3) Affine sets, convex sets and cones, convex functions, closures of convex functions, continuity of convex functions, separation theorems, directional derivatives and subgradients, ordinary convex programs and Lagrange multipliers. Fenchel's duality theorem, saddle-functions.
MTG 6277—Theory of Convexity II (3)
MTG 6278—Theory of Convexity III (3)
MTG 6346—Topology I (4) *Prereq: MTG 5317.* A basic introduction to advanced topology. Topics covered include general topology, algebraic topology, homotopy theory and topology of manifolds.
MTG 6347—Topology II (4) *Prereq: MTG 6346.*
MTG 6348—Topology III (4) *Prereq: MTG 6347.*
MTG 7396—Advanced Topics in Topology I (3; max: 6) *Prereq: MTG 6348.* Topics change yearly.
MTG 7397—Advanced Topics in Topology II (3; max: 6)
MTG 7398—Advanced Topics in Topology III (3; max: 6)

MECHANICAL ENGINEERING
College of Engineering

GRADUATE FACULTY 1979-80

Chairman: R. B. Gaither. *Graduate Coordinator:* R.K. Irey. *Distinguished Service Professor:* E.A. Farber. *Professors:* R. B. Gaither; R.K. Irey; J. Mahig; C.C. Oliver; V.P. Roan; G.N. Sandor; D. Tesar; G.L. Zachariah. *Associate Professors:* R.A. Gater; C.K. Hsieh; G. Piotrowski. *Assistant Professor:* H.A. Ingley, III.

Programs are available leading to the degrees of Master of Science, Master of Engineering, Engineer, and Doctor of Philosophy. General areas or programs within which students may specialize are biomechanical systems, energy conversion systems, mechanical systems, and thermal systems.

Within the specializations noted above are unique opportunities to complete theoretical and experimental research investigations in a wide variety of subspecialities including acoustics, automatic controls, biomechanics, combustion, cryogenics, energy conversion, environmental control, fluid dynamics, gas dynamics, heat transfer, kinematic synthesis, machine dynamics, propulsion, solar energy, thermodynamics, and vibrations.

EML 5104—Classical Thermodynamics (3)
EML 5105—Statistical Thermodynamics (3)
EML 5152—Intermediate Heat Transfer (3)
EML 5223—Design Synthesis in Vibrations (3)
EML 5224—Engineering Acoustics and Noise Control (3)
EML 5273—Advanced Dynamics of Machinery (3)
EML 5311—Control System Theory (3)
EML 5526—Biomechanics of Surgical Implants (3)
EML 5527—Similitude in Mechanical Engineering Design (3) Principles of similitude for model sign, analysis, and design analogies. Similitude as a basis for design optimization.
EML 5605—Advanced Refrigeration (3) *Prereq: EML 4522.*
EML 5714—Gas Dynamics of Internal Flow Systems (3)
EML 6103—Advanced Thermodynamics (3) Thermodynamics of nonsimple systems. Multicomponent and multiphase thermodynamic analysis.
EML 6108—Advanced Statistical Mechanics and Kinetic Theory (3) *Prereq: EML 5105.* Highly degenerate Bose and Fermi systems. Statistical mechanics of dependent particles. The Boltzmann transport properties.
EML 6131—Combustion I (3)
EML 6132—Combustion II (3) *Prereq: EML 6131.*
EML 6154—Conduction Heat Transfer (3) *Prereq: MAP 3302, EML 4140.*
EML 6155—Convective Heat Transfer I (3)
EML 6156—Convective Heat Transfer II (3) *Prereq: EML 6155.*
EML 6157—Radiation Heat Transfer (3) *Prereq: MAP 3302, EML 4140.*
EML 6159—Special Topics in Heat Transfer (3) *Prereq: EML 4140.*
EML 6254—Advanced Noise Control (3) *Prereq: EML 5224 or consent of instructor.*
EML 6272—Dynamics of Mechanical Systems (3) *Prereq: EML 4220.*
EML 6274—Dynamic Synthesis of Direct Contact Mechanisms (3) *Prereq: EML 4501.* The design of direct contact mechanisms by classical techniques of rigid body systems and finite differences applied to systems composed of elastic components.
EML 6275—Coplanar Kinematic Synthesis I (3) *Prereq: EML 3260.* Multiply separated position theory for 3, 4, and 5 positions of the moving system. Curvature transformation, circle point curves, and Burmester point theory. Treatment is analytical, with emphasis on the theory of algebraic curves.
EML 6276—Coplanar Kinematic Synthesis II (3) *Prereq: EML 6275.* Application of theory in EML 6275. Point-path, coplanar and function generation synthesis problems for linear, circular, or geared constraints. Reduction of parameters and optimization concepts.
EML 6277—Spatial Kinematic Synthesis and Analysis (3) Geometry of motion in three dimensions. Single position design depending on orders of contact with spatial curves. Finitely separated position design by matrix methods. Synthesis and analysis of spatial motions.
EML 6278—Advanced Rotor Dynamics (3) *Prereq: EML 4263 or 4220 and consent of instructor.* Analysis of dynamic stability, critical speeds, and unbalance response of rotor-bearing systems. Special problems encountered in modern applications operating through and above the critical speeds.
EML 6306L—Instrumentation and Measurements Laboratory (1)
EML 6417—Solar Energy Utilization (3; max: 6) Solar energy; its availability and characteristics; its conversion and utilization as heat for power, refrigeration, distillation, photochemical reactions; solar energy as a research tool.
EML 6418—Special Topics in Solar Energy (3; max: 9) *Prereq: undergraduate course in thermodynamics and heat transfer.* Selective surfaces, solar traps, solar energy storage, solar fuel cells, direct conversion of solar radiation.
EML 6452—Energy Conversion (3) Conversion of available forms of energy into mechanical and electrical forms; energy conversion schemes, including conventional cycles in unusual environments, MHD, solar cells, thermionic and photogalvanic conversion and fuel cells.
EML 6506—Sliding-Element Bearing Analysis and Design (3) *Prereq: EML 4709, EGN 3353 or EAS 4106.* Theory and design analysis of hydrodynamic bearings and boundary lubricated sliding bearings.
EML 6507—Rolling-Element Bearing Analysis and Design (3) *Prereq: EML 4500 and 4501 or EGM 5533.* Theory and design analysis of ball bearings and roller bearings.
EML 6508—Computer-Aided Design: Optimization (3) *Prereq: EML 5527, ESI 4312.* Parameter optimization techniques in machine systems.
EML 6606—Advanced Air Conditioning I (3) *Prereq: EML 4600.* Air-conditioning system selection and system design; air handling techniques including noise control, cleaning, temperature and humidity control; modern technological development and economic analysis.
EML 6607—Advanced Air Conditioning II (3) *Prereq: EML 6606.* Industrial applications, special requirements for hospitals, schools, survival shelter criteria.
EML 6715—Special Topics in Fluid Dynamics (3) *Prereq: EML 4709.*
EML 6716—Thermodynamics of Fluid Flow I (3)

EML 6717—Thermodynamics of Fluid Flow II (3) *Prereq: EML 6716.*
EML 6718—Thermodynamics of Fluid Flow III (3) *Prereq: EML 6717.*
EML 6905—Individual Projects in Mechanical Engineering (1-3; max: 12)
EML 6906—Advanced Mechanical Laboratory I (3) Experimental projects in mechanical engineering.
EML 6911—Mechanical Research I (1-3; max: 6) Research projects in mechanical engineering.
EML 6910—Supervised Research (1-5)
EML 6935—Graduate Seminar (1; max: 9) S/U.
EML 6940—Supervised Teaching (1-5)
EML 6971—Research for Master's Thesis (1-15)
EML 7980—Research for Doctoral Dissertation (1-15)

MEDICAL SCIENCES—GENERAL
College of Medicine

The College of Medicine offers programs leading to the Doctor of Philosophy and Master of Science degrees in the basic medical sciences, with specialization in anatomy, biochemistry and molecular biology, immunology and medical microbiology, neuroscience, pathology, pharmacology and therapeutics, and physiology. The Department of Biochemistry and Molecular Biology also offers separate Ph.D. and M.S. programs. Training in these scientific disciplines is planned to prepare the student for a career in research and teaching, rather than in clinical practice for which the Doctor of Medicine degree program is designed.

The graduate faculty and the courses offered are listed under department headings in this *Catalog*. A minor is not required but may be chosen in another of the basic sciences listed below or elsewhere in the *Catalog*. All facilities of the College of Medicine are available to graduate students in this program. Though an undergraduate major in biological or physical science is desirable, concentration in mathematics or engineering is an appropriate foundation for the Ph.D. in medical sciences. Satisfactory completion of a thesis based on research is a requirement for a graduate degree in the medical sciences (see *College of Medicine Catalog*).

In addition, the College of Medicine offers a Medical Scientist Training Program (combined M.D.-Ph.D. degree) to highly qualified students. Candidates for this five-to-seven-year program must satisfy admission requirements of both the College of Medicine and the Graduate School. Applicants should specify the basic science department to which admission is sought; they will be admitted following independent approval by the Medical Admissions Committee, the departmental Graduate Selection Committee, and a Medical Scientist Training Program Board. Applications are coordinated through the Office of the Dean of the College of Medicine. Study and dissertation research in departments other than basic science departments in the College of Medicine may be included in this program.

APB 5415—Radioisotope Theory and Techniques (5) *Prereq: CHM 3120C or consent of instructor.* Theory of radioactivity, interaction with matter, and radioactive decay given in sufficient detail to make the laboratory techniques and practices thoroughly understood.
GMS 6905—Research in Medical Sciences (1-15; max: 15) Supervised research other than that for the thesis or dissertation in biochemistry, immunology and medical microbiology, neuroscience, pathology, physiology, and pharmacology.
GMS 6910—Supervised Research (1-5; max: 5)
GMS 6920—Clinical Rounds for Graduate Students (2-5; max: 10) *Permission of coordinator and clinical instructor necessary.* Graduate students of the medical sciences disciplines will attend conferences and attend ward rounds with a clinical mentor on the service of their choice. May be repeated.
GMS 6940—Supervised Teaching (1-5; max: 5)
GMS 6971—Research for Master's Thesis (1-15)
GMS 7980—Research for Doctoral Dissertation (1-15)

MEDICINAL CHEMISTRY
College of Pharmacy

GRADUATE FACULTY 1979-80

Chairman: N. S. Bodor. *Graduate Coordinator:* R. J. Bergeron. *Professors:* N. S. Bodor; L. G. Gramling *(Emeritus)* ; R. H. Hammer; K. V. Rao; S. G. Schulman. *Associate Professor:* R. J. Bergeron. *Assistant Professor:* B. D. Andresen.

The College of Pharmacy offers Master of Science in Pharmacy and Doctor of Philosophy degrees in pharmaceutical sciences, with specialization in pharmaceutical chemistry.

Specific areas include research in pharmaceutical analysis, analytical toxicology, drug metabolism, prodrugs, natural product chemistry, enzyme-substrate binding mechanisms, drug binding to proteins and nucleic acids, and the design and synthesis of medicinal agents.

The applicant should have an undergraduate degree in pharmacy, chemistry, biology, or premedical sciences. A background in calculus and physical and organic chemistry is required.

PHA 5609—Pediatric Pharmacy (3) *Prereq: 5PH status, PHA 4516 and PHA 4517.* This course will provide pharmacy students interested in the unique aspects of drug therapy for children with information and experiences about dosage requirements and calculations, therapeutics, pathology, drug monitoring, and clinical pharmacy services.
PHA 6354—Natural Medicinal Products I (3) Chemistry of compounds derived from plants and animals.
PHA 6355—Natural Medicinal Products II (3)
PHA 6356—Natural Medicinal Products III (3)
PHA 6357L—Natural Medicinal Products I (3) Accompanying laboratory course for PHA 6354. Isolation and identification of plant and animal products.
PHA 6358L—Natural Medicinal Products II (3) Accompanying laboratory course for PHA 6355. Isolation and identification of plant and animal products.
PHA 6416—Pharmaceutical Analysis I (5) Theory and applications of separation of drugs and breakdown products from dosage forms and biologic media, employing precipitation, volatilization, complexation, partition, chromatographic procedures.
PHA 6417—Pharmaceutical Analysis II (5) Methods of quantitating and determining the structure of drugs and their breakdown products in any media, utilizing various spectroscopic and electronic technics.
PHA 6418—Pharmaceutical Analysis III (5) Use of electrochemical and radiochemical methods of measurement in pharmaceutical systems, including potentiometry, polarography, conductimetry, neutron activation.
PHA 6445—Drug Design (5) *Prereq: PHA 6470.* Theoretical treatment of structure-activity relationships and approaches to drug design.
PHA 6470—Synthetic Medicinal Products I (3) Preparation of the more complex synthetic medicinals. Relationship between chemical constitution and physiological action.
PHA 6471—Synthetic Medicinal Products II (3)
PHA 6472L—Synthetic Medicinal Products I (3) Accompanying laboratory course for PHA 6470. Synthesis of organic medicinal compounds.

PHA 6473L—Synthetic Medicinal Products II (3) Accompanying laboratory course for PHA 6471. Synthesis of organic medicinal compounds.
PHA 6474—Synthetic Medicinal Products III (3)
PHA 6905—Research Procedures in Pharmaceutical Chemistry (2-6) *Prereq: departmental consent.* Laboratory research, advanced discussion and reading in organic pharmaceutical chemistry, analytical pharmaceutical chemistry, and natural products. Research problems of interest to the student and his program.
PHA 6910—Supervised Research (1-5)
PHA 6934—Seminar in Pharmaceutical Chemistry (1) *Required of pharmaceutical chemistry majors; open to others by permission of department.* Weekly presentation and discussion of research reports based upon programs in the College or reports in the literature.
PHA 6940—Supervised Teaching (1-5)
PHA 6971—Research for Master's Thesis (1-15)
PHA 7980—Research for Doctoral Dissertation (1-15)

MICROBIOLOGY AND CELL SCIENCE
College of Agriculture

GRADUATE FACULTY 1979-80

Chairman: P. H. Smith. *Graduate Coordinator:* A. S. Bleiweis. *Graduate Research Professor:* I. K. Vasil. *Professors:* H. C. Aldrich; A. S. Bleiweis; J. W. Brookbank; G. E. Gifford; J. H. Gregg; E. M. Hoffmann; P. H. Smith; M. E. Tyler. *Associate Professors:* P. M. Achey; F. C. Davis, Jr.; D. E. Duggan; D. H. Hubbell; L. O. Ingram; G. C. Karp; J. A. Koburger; J. F. Preston, III; E. P. Previc; K. L. Smith; S. G. Zam. *Assistant Professors:* G. Bitton; S. E. Coleman; S. R. Farrah; N. J. Schneider; R. L. Tate, III.

Graduate study is offered leading to the Master of Science and Doctor of Philosophy degrees in microbiology and cell science. Instruction and guidance are collaborative among faculty in the Colleges of Liberal Arts and Sciences, Agriculture, and Medicine, and the Florida Bureau of Laboratories.

Student research areas include anaerobic metabolism; marine ecology; cell wall chemistry and immunochemistry; complement immunochemistry; cytokinesis; RNA, DNA protein synthesis; physiology of blue-green bacteria; bacterial and phage genetics; dairy, soil, or food microbiology; cellular and developmental biology in eucaryotic systems with research interests ranging from cell growth to morphogenesis and cell differentiation.

Prerequisites for admission to graduate study in addition to those of the Graduate School, are a broad educational background including mathematics, physics, and chemistry through organic, analytical, and physical chemistry; basic courses in botany and zoology; and preferably, at least one course in bacteriology. An undergraduate major in physical science, engineering, or general biology is usually acceptable. Receipt of an advanced degree requires detailed knowledge in biology, microbiology, and chemistry; undergraduate deficiencies may require additional course work prior to entry into the graduate program.

APB 6933—Special Topics in Radiation Biology (5) *Prereq: one year each of college physics, mathematics, and biology or botany; chemistry through organic.* Readings and research on the biological effects of radiation, with emphasis on cellular effects and mechanisms.
BOT 6256C—Plant Cytology (5) *Prereq: MCB 4403 or equivalent.* Fundamental structures of plant cells, their functions, reproductions, and relation to inheritance; recent research and techniques.
BOT 6316C—Developmental Morphology of Seed Plants (5) *Prereq: BOT 3303.* Developmental morphology of the vegetative and reproductive organs of flowering plants, with particular emphasis on form and function as revealed in recent experimental techniques.
BOT 6326C—Methods and Applications of Plant Cell and Tissue Cultures (5) *Prereq: BOT 6316.* Laboratory techniques for the culture of plant protoplasts, cells, tissues, and organs, and their applications to the study of cell differentiation, development, genetics, and agriculture.
EES 6106—Environmental Microbiology (4) Interaction between microbial populations. Behavior of microorganisms of fresh water, water, marine, and soil environments. Stress due to pollution on microbial communities.
ENU 5626—Radiation Biology (5) *Prereq: one year each of college biology, chemistry, and physics or the equivalent.* Effects of radiation on biological molecules, cells, and man including cancer, aging, and mutagenesis; use of radiation in the treatment of disease.
ENU 5629—Radiation Biology Laboratory (2) *Prereq or coreq: ENU 5629 and permission of instructor.* Selected experiments on radiation effects on viruses, bacteria, mammalian cells, and animals.
MCB 5605C—Microbial Ecology (5) *Prereq: consent of instructor.* Environmental interactions of microorganisms; emphasis on estuarine and marine bacteria.
MCB 6127—The Literature of Microbiology (3) *Prereq: 12 credits of microbiology.* Bibliographic method in searching the literature. Literature of specified areas of the discipline.
MCB 6306—Microbial and Cell Genetics (4) *Coreq: BCH 6415.* Molecular structure and function of procaryotic and eucaryotic genes. Emphasis on microbial genetics, including mutation, recombination and episomes.
MCB 6407C—Microbial and Cell Physiology (4) *Coreq: BCH 6065.* Structural and functional elements of procaryotic and eucaryotic cells. Control of DNA replication, cell division, cell-wall and ribosome formation, structure of organelles and features of normal and abnormal growth division.
MCB 6417C—Microbial and Cell Metabolism (4) *Coreq: BCH 6206.* Intermediary metabolism of procaryotic and eucaryotic cells. Metabolic pathways and regulation of catabolic and anabolic systems.
MCB 6457C—Regulation in Biological Systems (5) *Prereq: MCB 4413, 4303, 6417, BCH 6060, 6206.* Control of enzyme activity; kinetic, structural, inhibition (allosteric and non-allosteric), and energy level control; permeases; control of enzyme synthesis; positive and negative; repression, induction, catabolic repression, cyclic AMP; hormonal control.
MCB 6506—Virology (5) Selected topics on modern concepts of the nature of viruses and mechanism of viral infection; animal, bacterial, and plant viruses.
MCB 6506L—Virology Laboratory (3) *Prereq or coreq: MCB 6506.* Selected laboratory experiments on the nature of viruses and mechanisms of viral replication; other consequences of viral infections.
MCB 6520—Viral Diseases (3) *Prereq: MCB 6506.* Pathogenesis of viral disease, including cytopathic and oncogenic viruses. Diagnostic and preventive measures.
MCB 6757C—Biology of Uncommon Microorganisms (5) *Prereq: MCB 3013.* Natural distribution, metabolic activities, isolation, and culture of selected groups of microorganisms.
MCB 6905—Experimental Microbiology (1-12) *Prereq: 12 credits in microbiology and cell science.* Application of physical, chemical, and biological techniques to experimental problems in microbiology. Individual laboratory study.
MCB 6910—Supervised Research (1-5)
MCB 6913—Research Planning (5) *Prereq: 20 credits in progressive study of microbiology.* Processes involved in scientific research, including initiating a problem, experimental techniques, analyses and evaluation of data, and reporting, illustrated by bacteriological examples.
MCB 6930—Seminar (1; max: 12) Attendance required of all graduate majors at one research presentation each week as scheduled.
MCB 6937—Special Topics in Microbiology (1-6; max: 18) *Prereq: six credits in graduate major courses.* Contemporary research in a particular aspect of general microbiology.
MCB 6940—Supervised Teaching (1-5)
MCB 6971—Research for Master's Thesis (1-15)

MCB 7914—Research Conference (1; max: 12) Critical discussion and appraisal of research programs of faculty and students of the department. S/U.
MCB 7922—Journal Colloquy (1; max: 12) Critical presentation and discussion of recent original articles in the microbiological literature. Attendance required.
MCB 7980—Research for Doctoral Dissertation (1-15)
PCB 6176—Electron Microscopy of Biological Materials (2) Use of the electron microscope including fixation, embedding, sectioning, freeze-etching, negative staining and use of vacuum evaporator.
PCB 6176L—Laboratory in Electron Microscopy (2) *Prereq: MCB 4403 or equivalent, EES 6106 or concurrent registration in EES 6106, and consent of instructor.* Laboratory training in use of electron microscopes, ultramicrotomes, vacuum evaporators, and freeze-etch machines.
PCB 6216—Cytochemistry (4) *Prereq: MCB 4403 or equivalent.* Cellular organization, cell function, and cytochemical technique.
PCB 6236—Principles of Immunology (5) *Prereq: PCB 4233 or BMS 5300.* Biological and biochemical aspects of host resistance and immunity. Chemical and physiochemical properties of the proteins of immune reactions.
PCB 6236L—Immunology Laboratory (3) *Prereq: consent of staff. Coreq: PCB 6236.*
PCB 6256—Current Topics in Developmental Biology (3) *Prereq: PCB 3253 or equivalent.* Discussions of recent contributions to the field and related technology.
ZOO 6226—Protozoology (5) *Prereq: APB 4544 or equivalent.* Ultrastructure and life cycles of protozoa. Emphasis on cellular organization, cell functions, organelles and reproduction.

MUSIC
College of Fine Arts

GRADUATE FACULTY 1979-80

Chairman: B. A. Udell. *Graduate Coordinator:* D. Z. Kushner. *Professors:* W. R. Bodine, Jr.; R. W. Bowles; W. J. G. Brask; J. P. Hale; E. J. Keister; J. S. Kitts; S. P. Kniseley; D. Z. Kushner; R. Poole; E. C. Troupin; D. L. Wilmot. *Associate Professors:* P. E. Dorman; B. A. Udell; F. B. Wickes.

The Master of Fine Arts degree in music (emphases in music history, literature and citicism; music theory and composition; applied music; sacred music; and conducting) is offered in the College of Fine Arts.

The Department of Music cooperates with the College of Education in offering courses leading to the following degrees: Master of Education in music education (nonthesis degree); Master of Arts in Education in music education (thesis degree); Specialist in Education in music education; Doctor of Philosophy in college music teaching (emphases in music history, literature and criticism; music theory and composition; performance practices; and music education); and Doctor of Education in college music teaching (emphasis in music education).

During the week of the student's first registration, he/she must take placement examinations in applied music, in music history and literature, in music theory, and in music education for the music education emphasis. Music education students must satisfy requirements for music teaching certification in Florida before the appropriate degree is awarded.

MUC 6401—Composition of Electronic Music (4) *Prereq: MUC 4301.*
MUE 6143—Music in the School (2-9; max: 9) Offered by extension only. In-service training for teachers.
MUE 6396—Methods of Research in Music Education (4) Materials and specialized techniques of research in music education.
MUE 6932—Topics in Music Education (4; max: 12) *Prereq: MUE 6396 or MUS 6716.* Study of selected areas of music education culminating in a research paper or article.
MUE 7932—Topics in Music Education (4; max: 12) For doctoral students. Study of selected areas of music education culminating in a research paper or article.
MUH 6050—Graduate Music History Review (4)
MUH 6930—Topics in Musicology (4; max: 12) Work culminating in a research paper or article or in the public performance of a musical work of historical importance.
MUH 7930—Topics in Musicology (4; max: 12) For doctoral students. Work culminating in a research paper or article or in the public performance of a musical work of historical importance.
MUL 6931—Topics in Music Literature (4; max: 12) Intensive study of specialized areas of musical literature.
MUL 7931—Topics in Music Literature (4; max: 12) For doctoral students. Intensive study of specialized areas of musical literature.
MUN 6000—Graduate Ensemble (1) For graduate students holding positions of leadership and participating in music ensembles.
MUS 5665—Music Criticism (4) History and literature of music criticism. Practical experience in writing reviews of musical compositions and of live and recorded musical performances.
MUS 6716—Methods of Musical Research and Bibliography (4) Materials and specialized techniques of research in musicology.
MUS 6905—Projects and Problems in Music (5; max: 15) Approved problems for study and research.
MUS 6910—Supervised Research (1-5)
MUS 6940—Supervised Teaching (1-5)
MUS 6971—Research for Master's Thesis (1-15)
MUS 6973—Individual Project (1-15) Max. 15 credits applicable toward master's degree. Creative project or graduate recital in lieu of written thesis. Project or recital must be acceptable to candidate's supervisory committee and to the Graduate School. S/U.
MUS 7905—Projects and Problems in Music (5; max: 15) For doctoral students. Approved problems for study and research.
MUT 6051—Graduate Music Theory Review (4)
MUT 6751—Pedagogy of Music Theory (4)
MUT 6930—Topics in Music Theory (4; max: 12) Work culminating in a musical composition, arrangement, research paper, or public lecture-performance.
MUT 7930—Topics in Music Theory (4; max: 12) For doctoral students. Work culminating in a musical composition, arrangement, research paper, or public lecture-performance.
MVO 6250—Secondary Applied Music (3; max: 18) Offered in piano, voice, organ, harpsichord, historical instruments, conducting, and all standard band and orchestral instruments.
MVO 6460—Applied Music (3; max: 18) Offered in piano, voice, organ, harpsicord, historical instruments, conducting, and all standard band and orchestral instruments.
MVO 7260—Secondary Applied Music (3; max: 18) For doctoral students. Offered in piano, voice, organ, harpsichord, historical instruments, conducting, and all standard band and orchestral instruments.
MVO 7470—Applied Music (3; max: 18) For doctoral students. Offered in piano, voice, organ, harpsichord, historical instruments, conducting, and all standard band and orchestral instruments.

NEUROSCIENCE
College of Medicine

GRADUATE FACULTY 1979-80

Acting Chairman: W. G. Luttge. *Graduate Coordinator:* M. B. Heaton. *Professors:* J. J. Bernstein; G. Freund; P. E. Mahan; C. J. Vierck. *Associate Professors:* A. J. Dunn; R. L. King; C. M. Leonard; W. G. Luttge; J. B. Munson; G. W. Sypert; C. Van Hartsveldt; D. W. Walker; S. F. Zornetzer. *Assistant Professors:* W. E. Brownell; M. B. Heaton; F. J. Thompson.

The Department of Neuroscience offers specialization leading to the Master of Science and Doctor of Philosophy degrees in the medical sciences. All students receive training in neuroanatomy, neurobehavioral science, neurochemistry, neuroembryology, neuroendocrinology, neurohistology, neuropharmacology, and neurophysiology.

Prospective students should have undergraduate training in biochemistry, physiology, statistics, and behavioral sciences. Students admitted with deficiencies in these areas will be required to obtain remedial training.

BMS 5511—Vision (4) *Prereq: consent of instructor.* Introduction to the methodology, anatomy, and function of vision.

BMS 6131C—Neurohistology (2) Histological approaches and techniques for the study of the neuronal, neuroglial, and mesenchymal cellular components of the central and peripheral nervous system. S/U.

BMS 6510—Neurophysiology (3) Physiology of nerve and muscle, central nervous system, and the special senses. Comparative aspects emphasized.

BMS 6512—A Survey of Sensory Systems (4) *Prereq: PCB 4745C or BMS 6510 or APB 3203 or GMS 7760.* A group of specialists provide a survey of theories and experimental data on human and subhuman sensory reception and encoding. Auditory, visual, and cutaneous and chemical senses are included.

BMS 6514—Seminar in Sensory Processes (1) Topics of current interest in various areas of the sensory specialities are discussed within the seminar framework. S/U.

BMS 6531—Physiology of the Central Nervous System (4) Special and current problems in brain and spinal cord function covered in seminars.

BMS 6532—Nerve as a Tissue (2) Seminar on current research problems in the area of cellular interactions in the nervous system. Readings and discussion from articles in the fields contributing to the physiology, chemistry, and anatomy of the nervous system.

BMS 7142C—Medical Neuroscience (6) Comprehensive overview of human neuroanatomy from the subcellular to the gross tissue level. Lectures cover neurochemistry, neuropharmacology, neurophysiology, neuroendocrinology and neurobehavioral biology. Clinical correlations and applications.

BMS 7143C—Structure and Function of the Auditory System (4-6) *Prereq: BMS 7142 or consent of instructor.* Laboratory-seminar on the anatomy and physiology of the auditory system. Stress on brain stem nuclei and their interconnections.

BMS 7165C—Recent Advances in Neuroscience (1-2; max: 16) Seminar and group discussions of recent advances in one or more areas of neuroscience.

BMS 7467—Physiology and Pharmacology of Excitable Membranes (3) Membrane ionic permeability changes underlying action and synaptic potential generation described in detail. Applications of electrophysiological and radioactive tracer techniques to analysis of drug action on excitable membranes.

BMS 7513—Physiological Basis of Brain Rhythms (3) Analysis of the structural, physiological, and pharmacological substrates for electrical activity of the central nervous system as manifested in the normal electroencephalogram, including the development and relationship to evoked potentials.

BMS 7533—Colloquium in Neurobiology (1-2; max: 16) Current theoretical issues that relate to the neurophysiological, physiological, chemical, and behavioral approaches to the study of the nervous system. S/U.

GMS 5702—Neurohumors and Behavior (4) *Prereq: STA 3023, BMS 5520, and PSB 3004.* Synthesis, action, and metabolism of putative neural transmitters; pharmacological means of altering these; physiological or behavioral functions attributed to putative neural transmitters.

GMS 6700—History of the Neurosciences (3) Discoveries, concepts, and technical advances in the basic nervous system disciplines from ancient to modern times. Emergence of the several neurosciences as experimental disciplines providing a foundation for rational medical applications.

GMS 6701—Comparative Neuroanatomy and Neurophysiology (1-4; max: 16) Phylogenetic development of the central nervous system of vertebrate animals considered from the anatomical, electrophysiological and behavioral points of view. S/U.

GMS 6703—Pain and Somesthesis (4) Current research on central nervous system coding and information, using somesthesis as a model, with particular emphasis on pain.

GMS 6710—Neurobiology (4) *Prereq: background in biological or behavioral sciences.* Structure and physiology of the nervous system as it pertains to control of behavior.

GMS 6732—Neuroendocrinology (4-6) Neural regulation of endocrine systems in vertebrate animals. Correlative study of neuronanatomical, neurophysiological, and neurochemical aspects of endocrine control.

GMS 7711—Neural-Behavioral-Endocrine Interactions (4) Interrelationships of endocrine hormones, nervous system activity, and behavior. Sample topics include the role of hormones in sexual behavior, aggression, stress, parental behavior, learning and memory, mood, and target organ physiology.

GMS 7712—Neurobehavioral Relations (4) Theories and data on the central nervous system basis for higher order function. Emphasis on arousal, purposeful behavior, and learning.

GMS 7713—Information Storage: A Neurobiological Approach (4) Consideration of data dealing with basic issues concerning the nature of behavioral plasticity and information storage and their central nervous system foundations. Particular emphasis on memory disruption and facilitation as an experimental tool in the study of memory processes.

GMS 7714—Developmental Neural-Behavioral-Endocrine Interactions (1-4) Interrelationships and roles of endocrine hormones, behavior, and nervous system activity during the perinatal period on the development of adult patterns of neuroendocrine activity and behavior.

GMS 7715—Integrative Neurobiology IV: Behavioral Neurobiology (6) Lecture and laboratory course concerning the neurobiological substrates of behavior, and neurobehavioral techniques.

GMS 7720—Motor Systems (4) Basic mechanisms involved in motor activity; muscle spindle system and its central control by spinal cord and supraspinal mechanisms. Emphasis on normal rather than abnormal processes.

GMS 7721—Neural Mechanisms of Ingestion and Energy Regulation (4) Neuroanatomical, neurobehavioral, and neuroendocrinological mechanisms involved in the regulation of food and water consumption and regulation of body weight.

GMS 7730—Functional Neurochemistry (1-4; max: 8) *Prereq: BMS 4021, GMS 7731, 7733 or consent of instructor.* A seminar course devoted to detailed analysis of selected topics of current interest in the relation of neurochemical processes to nervous system function.

GMS 7731—Molecular Neurobiology (4) *Prereq: biochemistry.* Discussion of current topics in neurochemistry. To include the metabolism of carbohydrates, lipids, amino acids, proteins and nucleic acids, the metabolism and function of neurotransmitters, and axoplasmic flow.

GMS 7733—Integrative Neurobiology I: Cellular and Molecular Neurobiology (6) Cellular and subcellular structure of nervous tissue. Nervous system biochemistry including metabolism and function of neurotransmitters. Axoplasmic transport. Degeneration and regeneration and trophic functions of nervous tissue.

GMS 7740—Neuroscience Seminar (1-2; max: 16) Readings and discussions of current topics in neuroscience. S/U.

GMS 7741—Special Topics in Neuroscience (1-6; max: 16) Intensive readings and lectures in specialized fields of neuroscience and allied disciplines.

GMS 7742—Research Methods in Neuroscience (1-10; max: 16) Research techniques in experimental neuroscience.

GMS 7743—Developmental Neurobiology (4) Seminar on the neuroanatomical and functional development of the nervous system. Includes discussion of mechanisms of embryonic neurogenesis, behavioral embryology, and current research in neuroembryology.

GMS 7750—Integrative Neurobiology II: Comparative Neuroanatomy (3) Lecture and laboratory course concerning

general principles of vertebrate neuroanatomy and brain and spinal cord organization. Mammalian neuroanatomy stressed.

GMS 7760—Integrative Neurobiology III: Systems Neurobiology (6) Lecture course concerning neurobiological systems: specifically the motor systems, nonspecific systems, sensory systems, and neurotransmitter-neuroendocrine systems.

NUCLEAR ENGINEERING SCIENCES
College of Engineering

GRADUATE FACULTY 1979-80

Acting Chairman: E. E. Carroll. *Graduate Coordinators:* E. E. Carroll; W. H. Ellis; G. S. Roessler. *Graduate Research Professor:* A. E. S. Green. *Professors:* W. E. Bolch, Jr.; E. E. Carroll, Jr.; G. R. Dalton; N. J. Diaz; B. G. Dunavant; W. Mauderli; M. J. Ohanian; R. T. Schneider; G. J. Schoessow; J. A. Wethington, Jr. *Associate Professors:* V. A. Brookeman; H. D. Campbell; W. H. Ellis; C. E. Roessler. *Assistant Professors:* L. T. Fitzgerald; G. S. Roessler.

The Department of Nuclear Engineering Sciences offers the degrees of Master of Science, Master of Engineering, Engineer, and Doctor of Philosophy with emphasis in nuclear power engineering, radiological sciences, or engineering physics and thermonuclear fusion; the radiological sciences option is offered through an interdepartmental program in cooperation with the Department of Environmental Engineering Sciences and the Medical School.

Specific areas of emphasis include advanced nuclear power concepts, nuclear reactor and power plant technology and operations, reactor dynamics and control, environmental aspects of nuclear power generation, neutron and reactor physics, nuclear plasma and laser technology, thermonuclear fusion systems, and nuclear radiation chemistry, high-temperature materials, nuclear detection and instrumentation, bionucleonics, energy systems analysis, medical radiation physics, radiation biology, and health physics.

The requirement for admission to the graduate program in nuclear engineering sciences is a bachelor's degree in an approved program in engineering or in the sciences. If the student's background is considered deficient for his planned course of study, an articulation program of background courses will be required.

Depending on professional objectives, the student may omit the master's thesis and substitute 12 credits of graduate-level course work, of which at least nine credits are in nuclear engineering sciences, including a six-credit (minimum) special project (ENU 6936). In such cases the completion of 48 credits will meet the minimum requirements for the nonthesis degree.

APB 5415—Radioisotope Theory and Techniques (5) *Prereq: CHM 3120 or consent of instructor.* The theory of radioactivity, of interaction with matter, radioactive decay given in sufficient detail to make the laboratory techniques and practices thoroughly understood.

ENU 5005—Fundamentals of Reactor Engineering (4) Survey of nuclear reactor concepts, instrumentation, operation fuels, materials, and shielding.

ENU 5148—Reactor Technology II (4) Quality assurance requirements for nuclear power plants.

ENU 5176L—Principles of Nuclear Reactor Operations (4) *Prereq: ENU 4104.* Reactor startup, reactor physics measurements and control calibrations, principles of control and operation and problems of power operation.

ENU 5186—Reactor Fuel Cycles (3) *Prereq: ENU 4104.* The fuel management problem in nuclear power reactors. Reactivity, breeding, fuel and fission product inventory as a function of life time; power distribution and fuel relocation.

ENU 5195—Nuclear Power Reactors I (4) *Prereq: ENU 4144 or consent of instructor.* Study of the various types of nuclear reactors for power generation, design, construction, materials, heat transfer and cooling systems.

ENU 6516L—Nuclear Engineering Laboratory II (4) *Prereq: ENU 4505L, 5615L. Coreq: ENU 6106.* Laboratory practice in neutron and gamma detection and analysis. Determination of basic neutron parameters in nonmultiplying and multiplying media.

ENU 6517L—Nuclear Engineering Laboratory III (4) Laboratory practice in measurement of basic reactor parameters and the effects of reactor perturbation.

ENU 6627—Radiological Physics (4) X-rays, including the production, properties, nature, circuits, and measurements; x-ray tubes, for both diagnosis and therapy; image amplifiers; the quality of x-rays, half-value layer, and x-ray filters; high energy electron accelerators and isotope therapy units.

ENU 6636—Fundamental Aspects of Reactor Shielding (3) *Prereq: ENU 6107.* Shielding design fundamentals. Methods of calculating gamma-ray attenuation, fast neutron penetration, effects of ducts and voids in shields, problems of heat generation and deposition in reactor components.

ENU 6646—Field Problems in Radiation Control (1-3) *Prereq: ENV 4241.* On-the-job training by rotation through each phase of the radiation control program, including surveys, radioisotope receipt, storage, distribution, bioassays, personnel monitoring, record keeping.

ENU 6656L—Medical Radiation Instrumentation and Dosimetry (4) *Prereq: ENU 6627 or equivalent.* Dosimetry instrumentation including ion chambers, semiconductor and luminescent devices; measurement in roentgens; measurement of absorbed radiation energy; manual and computer techniques in treatment planning for external beam therapy and implanted sources.

ENU 6657—Nuclear Medicine Instrumentation and Procedure (5) *Prereq: ENU 5615 or equivalent.* Theory, evaluation, applications of detecting and imaging systems in nuclear medicine, including collimators, scintillation probes, scanners, cameras, data-processing devices; uses of radionuclides in medicine for radiopharmaceutical preparation and *in vivo* and *in vitro* diagnostic procedures; internal radiation dosimetry.

ENU 6701—Gas Lasers and Their Engineering Applications (4) *Prereq: PHY 3123, ENU 4704.* Introduction to theory of gas lasers. Laser design; extensive coverage of application of gas lasers.

ENU 6707—Direct Energy Conversion (4) Various direct conversion systems, with emphasis on system involving nuclear reactors or nuclear reactions.

ENU 6717—Thermonuclear Fusion (3) Foundations of thermonuclear reactions. Methods of heating plasmas to extreme temperatures; plasma containment by magnetic fields; plasma instabilities.

ENU 6725—Plasma Spectroscopy (4) Spectroscopic techniques for measurement of temperature and density of plasmas, and their application to thermonuclear direct energy conversion devices.

ENU 6730—Introduction to Plasmas (3) Nomenclature, materials, and plasma devices, fundamentals of plasma kinetic theory, low and high pressure discharges, technical applications.

ENU 6731—Plasma Theory (4) *Prereq: ENU 6730.* Microscopic and macroscopic foundations of plasma theory. Nonequilibrium states and relaxation processes.

ENU 6741L—Plasma Laboratory (4) Laboratory practice in use of equipment and determination of basic parameters of plasma.

ENU 6745—Advanced Plasma Theory (4) *Prereq: ENU 6725.* Fundamental equations of statistical plasma theory: Vlasov, Boltzmann, Fokker-Planck, and radiation transport equations, their solution, and typical applications to plasmas.

ENU 6905—Individual Work (1-6; max: 18) Supervised study or research in areas not covered by other graduate courses.

ENU 6910—Supervised Research (1-5)

ENU 6935—Nuclear Seminar (1; max: 4) Discussion of re-

search current trends in the nuclear-related industry, government, and research establishments.

ENU 6936—Special Projects in Nuclear Engineering Sciences (1-9; max: 18) Nonthesis research projects.

ENU 6937—Special Topics in Nuclear Engineering Sciences (1-9; max: 18)

ENU 6940—Supervised Teaching (1-5)

ENU 6971—Research for Master's Thesis (1-15)

ENU 7980—Research for Doctoral Dissertation (1-15)

ENU 5414—Isotope Separation (3) Stable isotopes important for conventional nuclear reactors, isotopes important for fusion, methods for separating them.

ENU 5615L—Nuclear Radiation Detection and Instrumentation (4) Interaction of radiation with matter, radiation detector systems, pulse shaping, amplification, amplitude and time-analyzing circuitry; counting and measuring devices and control systems for nuclear reactors.

ENU 5625—Bionucleonics (3) *Prereq: One year each of college biology, chemistry, and physics or the equivalent.* Introduction to application of nuclear energy to human biomedical problems including the use of radioactive isotopes in biomedical research, medical diagnosis and therapy. Benefits to man weighed against potential hazards.

ENU 5626—Radiation Biology (5) *Prereq: One year each of college biology, chemistry and physics; permission of instructor.* Effects of radiation on biological molecules, cells, and man including cancer, aging, and mutagenesis; use of radiation in the treatment of disease.

ENU 5629—Radiation Biology Laboratory (2) *Prereq or coreq: ENU 5626 and permission of instructor.* Selected experiments on radiation effects on viruses, bacteria, mammalian cells, and animals.

ENU 6106—Reactor Analysis I (3) *Prereq: ENU 4103, 4104, 4144.* Neutron diffusion theory, homogeneous and one-velocity reactors. Time-dependent behavior of the neutron flux, reactor kinetics with temperature dependence.

ENU 6107—Reactor Analysis II (3) *Prereq: ENU 6106.* Reactor analysis in terms of the slowing-down model and Fermi-age theory. Six-factor formula, reactor temperature coefficients, introduction to perturbation theory as applied to reactivity calculations.

ENU 6108—Advanced Reactor Analysis (3) *Prereq: ENU 6107.* Analytical methods of heterogeneous reactor calculations, fundamentals of control-rod theory, disadvantage factor, thermal utilization, resonance escape probability, fast fission; monoenergetic transport theory.

ENU 6117—Neutron Transport Theory (3) *Prereq: ENU 6108.* Neutron transport equation, approximations based on orthogonal functions, variational techniques, and Monte Carlo methods applied to monoenergetic and energy-dependent transport theory.

ENU 6126—Fundamentals of Reactor Kinetics (4) *Prereq: ENU 6107.* Dynamic behavior of nuclear reactor systems from the point of view of linear control theory. Laboratory use of analog computer to study reactor kinetics problems.

ENU 6127—Advanced Reactor Kinetics (3) *Prereq: ENU 6126.* Nuclear reactor dynamics; spatially dependent kinetics; techniques of nonlinear stability analysis; kinetics of various reactor prototypes.

ENU 6147—Reactor Technology I (4) *Prereq: ENU 6107.* Theories of previous courses applied to analytical design and economics of an integrated fast reactor nuclear plant.

ENU 6167—Principles of Fast Reactors (3) *Prereq: ENU 6107.* Underlying mathematical techniques of fast reactor physics. Quantum mechanical procedures for nuclear processes involved in a fast reactor. Inelastic neutron scattering and resonance reactions.

ENU 6168—Fast Reactor Analysis (3) *Prereq: ENU 6167.* Computation of sodium void, Doppler and temperature coefficients, and fast reactor breeding ratio. Problems of fast reactor breeding.

ENU 6197—Nuclear Power Reactors II (4) *Prereq: ENU 4192, ENU 6106.* Improvements in safety systems, control, reliability, and new concepts for LWR.

ENU 6210—Computer Programs in the Nuclear Industry (4) *Prereq: ENU 6106, ESI 3502.* Description and use of the most widely employed methods and codes used in reactor physics calculations by industry.

ENU 6241—Numerical Methods of Reactor Analysis (4) *Prereq: ENU 6106.* Numerical solutions to reactor analysis problems, emphasis on the solution of one-, two- and three-dimensional diffusion equations, multiregion and multigroup diffusion methods. P^n and S^n calculations.

ENU 6257—Nuclear Data Acquisition and Processing (4) *Prereq: ENU 4505L, 5615L.* Acquisition and processing of data from nuclear detectors. Multi-input systems. Use of "on-line" digital computers for control of experiments. Special instrumentation techniques.

ENU 6307—Radioactive Tracer Instrumentation and Methodology (4) *Prereq: APB 5415.* Advanced techniques and theory of radioisotopes used as tracers and activation analysis in biological systems. Instrumentation, sample preparation, methods of calculation, kinetics of radiobiological investigations.

NURSING
College of Nursing

GRADUATE FACULTY 1979-80

Acting Dean: A. S. Baker. *Graduate Coordinator:* P. H. Barton. *Professors:* G. Anderson-Shanklin; P. H. Barton; M. E. Hilliard; L. N. Knowles. *Associate Professors:* A. S. Baker; M. E. Dougherty; E. E. Dykes; F. G. Harris; J. H. Patray; J. M. Wilson. *Assistant Professors:* P. A. Clunn; J. H. Davis; S. C. Frauman; M. J. Snider; J. R. Summey; C. E. Taylor; D. D. Williams.

The College of Nursing offers the Master of Nursing (nonthesis) and the Master of Science in Nursing (thesis) degrees. Areas of specialization are women's and infant's nursing; child health nursing—pediatric or psychiatric mental health; family and community health; and adult health care—medical surgical or psychiatric mental health. The functional areas offered are teaching, clinical specialization, and administration.

In addition to meeting the requirements of the Graduate School, an applicant must have an active R.N. license, a year's clinical practice experience, a baccalaureate degree in nursing from an accredited program with an upper division nursing major, and a three or four credit college-level course in statistics.

NUR 5940C—Internship in Professional Nursing (4; max: 12) *Prereq: Admission to the internship program.*

NUR 6150C—Theory and Practice in Women's and Infants' Nursing I (4) Health maintenance during the normal maternity cycle and early infancy. Emphasis on prenatal and postpartum management, well baby supervision and parent education. Seminars and clinical experiences with preceptor in selected clinical facilities.

NUR 6151C—Theory and Practice in Women's and Infants' Nursing II (4) Childbearing families at risk: A study of the contributing factors of childbearing families at risk. Emphasis on effect of these factors in health maintenance. Seminars and collaborative practice in selected clinical facilities.

NUR 6152C—Theory and Practice in Women's and Infants' Nursing III (4) Reproduction health maintenance through the life span. Assessment and management of common female health problems and family planning. Special consideration of the relationship of the women's movement to women's health care. Seminars and clinical experiences with preceptors in selected clinical facilities.

NUR 6153C—Theory and Practice in Women's and Infant's Nursing IV (4) Health maintenance of families with a focus on the primary care of women and infants. Clinical experiences planned in community health agencies that provide opportunity for functioning at policy making levels.

NUR 6164C—Child Health Nursing: Health Maintenance (4) Health maintenance from infancy through adolescence based on standards of child health care, knowledge of the developmental status and needs of family members, and principles of supportive family therapy. Selected seminar and clinical experiences according to student's major child health—i.e., psychiatric mental health or pediatric nursing.

NUR 6165C—Child Health Nursing: Acute Care (4) Facilitation of child and family adaption during crisis, emergencies, and acute physical and mental illnesses. Selected seminar and clinical experiences according to student's specialization in child health—i.e., psychiatric mental or pediatric nursing.
NUR 6166C—Child Health Nursing: Long Term Care (4) Management of long term chronic physical or mental illness and handicapping conditions of children and adolescents. Emphasis on promotion of optimal family adaptation. Selected seminars and clinical experiences according to student's specialization in child health—i.e., psychiatric mental or pediatric nursing.
NUR 6167C—Child Health: Developmental Theories and Assessment (4) Concepts and theories in advanced child health care with emphasis on developmental processes, theories and assessment. Selected seminars and clinical experiences according to student's major in child health, i.e., psychiatric mental health nursing or pediatric nursing.
NUR 6450C—Client Assessment for Nurses (4) Theory and practice in client evaluation. Focus on basic assessment skills. Seminars and clinical experiences in selected clinical facilities.
NUR 6460C—Family and Community Health Nursing I (4) Theories of family dynamics, concepts of family health care, and community health care are studied as a basis for implementing expert nursing care to families by the clinical specialist. Emphasis is on community assessment with problem identification and family health care maintenance and illness prevention.
NUR 6461C—Family and Community Health Nursing II (4) Seminar and practicum with emphasis on management of common health problems which occur in families having members from birth through adolescence. Community content emphasizes planning strategies for solution of community health problems.
NUR 6462C—Family and Community Health Nursing III (4) Continuation of NUR 6461C with emphasis on management of common health problems of adult members of the family. Community emphasis involves implementation of plans for solving a community health problem.
NUR 6463C—Family and Community Health Nursing IV (4) Emphasis is on primary care management and advanced nursing interventions with families experiencing complex problems. The community emphasis is on evaluation of the community health problem intervention process.
NUR 6550C—Theory and Practice in Adult Health Care I (4) Intensive study of the criteria, methodology, and principles utilized in assessment and therapeutic planning as they apply to the nursing care of adults. Selected seminars and clinical experiences according to the student's specialty area in adult health care.
NUR 6551C—Theory and Practice in Adult Health Care II (4) Continuation of NUR 6550C.
NUR 6552C—Theory and Practice in Adult Health Care III (4) Critical review of current research and literature on the therapeutic and nontherapeutic effects of clinical interventions commonly utilized in the care of adults. Selected seminars and clinical experiences according to the student's specialty area in adult health care.
NUR 6553C—Theory and Practice in Adult Health Care IV (4) Focus on advanced nursing interventions of selected adult problems.
NUR 6905—Individual Study (1-5)
NUR 6910—Supervised Research (1-5)
NUR 6931—Special Topics in Nursing (2-4)
NUR 6940—Supervised Teaching (1-5)
NUR 6945—Practicum in Nursing (4-12)
NUR 6948—Residency (4; max: 12) *Prereq: Master's degree in nursing; admission to the residency program.*
NUR 6971—Research for Master's Thesis (1-15)
NUS 6215—Physiological Bases of Professional Nursing (4) A lecture-discussion series that provides advanced study of human physiology. Normal functions of organ systems and pathological interruptions of normal functioning. Physiological changes which occur throughout life span and their implications for nursing practice.
NUU 6165—Life-Span Development: Concepts and Issues (4) Study of selected theories regarding development over the life-span with emphasis on their application to the understanding of normative life crises and to clinical nursing.
NUU 6460—Conceptual Bases of Professional Nursing (4) A seminar focusing on the theoretical and conceptual models for nursing practice, research, and education.
NUU 6462—Nursing Perspectives I: Analysis of Health Care Systems (4)
NUU 6463—Nursing Perspectives II: Administration of Nursing Services (4)
NUU 6464—Nursing Perspectives III: Systems of Nursing Education (4)
NUU 6465—Nursing Perspectives IV: Cultural Influences on Health Care (4)
NUU 6466—Nursing Perspectives V: Impact of Health Policy Systems on Nursing (4)
NUU 6467—Nursing Perspectives VI: Economics of Health Care and Delivery of Nursing Services (4)
NUU 6468—Nursing Perspectives VII: Profiles of Professional Nursing (4)
NUU 6469—Nursing Perspectives VIII: Nursing Curricula and Instructional Design (4)
NUU 6650—Nursing Research I (4)
NUU 6651—Nursing Research II (4)

OCCUPATIONAL THERAPY
College of Health Related Professions

GRADUATE FACULTY 1979-80

Chairman & Graduate Coordinator: L. A. Llorens. *Professor:* L. A. Llorens. *Associate Professors:* K. W. Sieg; C. J. Slaymaker.

The Department of Occupational Therapy offers the Master of Health Science degree with specialization in pediatric and psychiatric occupational therapy.

Preparation for positions in teaching, administration, or research in occupational therapy programs is provided by means of elective options available in the curriculum.

In addition to the requirements of the Graduate School, admission to graduate study in occupational therapy requires the candidate to (1) have a bachelor's degree and (2) have completed an accredited curriculum in occupational therapy. Current registration with the American Occupational Therapy Association is acceptable as evidence of completion of an accredited curriculum.

OTH 6418—Clinical Problems (4) Current theories of growth and development, disorders and dysfunctions in occupational therapy.
OTH 6419—Clinical Problems (4) *Prereq or coreq: OTH 6418.* Care of disorders and dysfunction within health systems by occupational therapy.
OTH 6539C—Seminar: Occupational Therapy Management (4) *Prereq: OTH 6418.* Evaluation techniques in occupational therapy.
OTH 6549C—Seminar: Occupational Therapy Management (4) *Prereq: OTH 6539.* Treatment modalities in occupational therapy.
OTH 6770—Research Methods in Occupational Therapy (3) Research design applicable to clinical problems and settings.
OTH 6780—Proseminar (3) *Prereq or coreq: OTH 6770, 6539.* Investigation of clinical, academic, or administrative problems in occupational therapy. H.
OTH 6827L—Advanced Specialty Practicum (3-5) *Prereq or coreq: OTH 6539.* Field experience in clinical and community settings.
OTH 6861L—Specialty Residency (3-15) *Prereq: OTH 6780.* Field experience in clinical, community and administrative settings approved by the department.
OTH 6905—Individual Work (1-15) *Prereq: OTH 6780, 6827.* Project related to teaching, research, or administration.

PATHOLOGY
College of Medicine

GRADUATE FACULTY 1979-80

Chairman: R. T. Smith. *Associate Chairman:* R. L. Hackett. *Graduate Coordinator:* C. Moscovici. *Professors:* C. E. Cornelius; W. F. Enneking; R. R. Grams; R. L. Hackett; C. Moscovici; S. J. Normann; R. T. Smith; H. Stanley; J. D. Woodard. *Associate Professors:* H. H. Baer; R. Braylan; C. A. Crandall; W. H. Donnelly; P. A. Klein; P. O. Teague. *Assistant Professors:* H. Burchardt; M. B. Calderwood; J. C. Gudat; V. C. Maino; K. H. Rand; S. E. Ryden; J. D. Scornik.

The Department of Pathology offers opportunities to qualified individuals for study leading to the Ph.D. in Medical Sciences with specializations in experimental pathology, clinical chemistry, and cellular immunobiology. Specialized training in one or more of the following areas is available: immunobiology, tumor biology, immunogenetics, infectious diseases, clinical chemistry, electron microscopy, tumor virology, comparative and nutritional pathology.

Experimental pathology at the University of Florida emphasizes the biological rather than chemical approach to the understanding of disease. Careers in pathology offer a diversity of opportunities: research on such topics as cancer, immunity, cardiac and vascular diseases, service in diagnostic laboratories affiliated with hospitals, and teaching.

Graduate students entering the experimental pathology program should have adequate undergraduate training in general chemistry, organic chemistry, general physics, general biology, and two or more advanced courses in the areas of physiological, developmental, or cellular biology, or in the case of students in clinical chemistry, courses in analytical, inorganic, and physical chemistry. Some students may be required to remedy deficiencies in their background by taking certain undergraduate courses after admission to the graduate program in pathology.

Program in General and Experimental Pathology

BMS 6601—Special Subjects in Systemic Pathology (var. 2-5; max: 5) *Prereq: BMS 6700 and consent of staff.* Pathological processes affecting specific organs and organ systems.

BMS 6606—Comparative Pathology (4) *Prereq: BMS 6700C.* Diseases of various organ systems of domestic and laboratory animals compared and contrasted with spontaneous diseases of man.

BMS 6620—Seminar in Pathology (1) *Required of graduate students in pathology; open to others by permission of the department.* Current research literature and research reports by graduate students, pathology staff, and invited speakers.

BMS 6621—Special Topics in Pathology (1-6; max: 18) *Prereq: permission of department.* Conferences and supervised laboratory work. Topics selected to meet each student's needs.

BMS 6644—Immunogenetics and Transplantation (4) *Prereq: BMS 6642, BMS 6314 and consent of instructor.* Role of the major histocompatibility complex in control of cell differentiation, immune responsiveness, alloreactivity, and disease susceptibility. Clinical implications of contemporary research and future application of idiotype/anti-idiotype systems.

BMS 6700C—Mechanisms of Disease (5) *Prereq: BMS 5110, 5300 and BCH 5051, BMS 6642 or consent of instructor.* General principles of pathology and the mechanisms responsible for disease processes.

Program in Clinical Chemistry

BMS 6612—Clinical Chemistry and Toxicology (3) Chemical techniques employed in the diagnosis of disease; methods in toxicology.

BMS 6613—Clinical Chemistry and Toxicology: A Rotation (var. 4-30; max: 30) *Prereq: BMS 6612.* Participation in all phases of practical clinical chemistry and toxicology. Chemical methodology, clinical interpretation, and significance of laboratory measurements used in diagnosing diseases. Individual investigative project in clinical chemistry and toxicology. Pathology graduate students specializing in clinical chemistry must spend three terms on this rotation.

BMS 7660—Medical Information Systems (3) Systems analysis techniques, both theoretical and practical, applied to the medical database. Communications within health care delivery systems studied.

Program in Cellular Immunobiology

BMS 6630—Tumor Biology (4) Pathobiology, biochemistry, and molecular biology of neoplasia; viral and chemical carcinogenesis; immunology and therapy of cancer in man and animals.

BMS 6631—Experimental Tumor Biology (3) *Prereq: BMS 6630 or consent of staff.* Development of laboratory skills and techniques used in study of various phenomena in tumor biology. Students will work in direct association with members of the BMS 6630 teaching faculty.

BMS 6641—Immunopathology (3) Abnormalities and diseases having immunological bases are studied.

BMS 6642—Immunobiology (5) *Prereq: BMS 6314 or instructor consent.* Biological aspects of the defense systems; specific and nonspecific and cellular and humoral amplification systems involving immune interactions; pathologic aspects of immunologic phenomena; phylogenetic and developmental aspects of immunity; current concepts in cellular immunology emphasized.

BMS 6642L—Immunobiology Laboratory (3) *Prereq: consent of staff. Coreq: BMS 6642.* Project oriented. Laboratory skills and techniques in immunobiology developed. Each student works in close association with a faculty member.

PHARMACOLOGY AND THERAPEUTICS
College of Medicine

GRADUATE FACULTY 1979-80

Chairman: A. H. Neims. *Graduate Coordinator:* W. R. Kem. *Graduate Research Professor:* T. H. Maren. *Professors:* K. C. Leibman; A. H. Neims; D. M. Travis. *Associate Professors:* G. M. Carlson; L. C. Garg; W. R. Kem; D. N. Silverman. *Assistant Professors:* S. K. Chapman; K. T. Shiverick.

The Department of Pharmacology and Therapeutics offers a program leading to the degree of Doctor of Philosophy in the medical sciences with specialization in pharmacology.

Specific areas of research specialization include autonomic and respiratory pharmacology, drug metabolism, renal and electrolyte pharmacology including transport of electrolytes into cerebrospinal fluid, carbonic anhydrase and its inhibitors, cellular neuropharmacology, and molecular pharmacology.

Applicants should present undergraduate course credits in chemistry, including quantitative analytical, organic, and physical chemistry; elementary physics and biology; and mathematics through calculus. Otherwise well-qualified students with certain deficiencies in preparation will be allowed to make these up during the first year of graduate study. In addition to elementary and advanced study in pharmacology, candidates will pursue courses in biochemistry, physiology, and other medical sciences as determined by consultation with their advisory committees.

BMS 5465—Advanced Medical Pharmacology (6)

BMS 6400—Introduction to Pharmacology (5) *Prereq: elementary courses in biochemistry and physiology.* Over-

view of the entire field of pharmacology as the study of the interactions between living systems and foreign chemicals. Intended to prepare majors for advanced courses or to familiarize nonmajors with the area.

BMS 6420—Seminar in Pharmacology (1) *Prereq: BMS 6400.* Research reports and discussions of current research literature by graduate students, faculty, and invited lecturers.

BMS 6463—Theoretical Pharmacology (5) *Prereq: BMS 6400, CHM 3401.* Physical, physiochemical, and mathematical aspects of pharmacology, including the theory of drug-receptor complexes, transport and distribution kinetics and equilibria, and the kinetics of enzyme inhibition by drugs.

BMS 6466—Physiological Pharmacology (5) *Prereq: BMS 6400.* Influence of drugs upon physiological systems. Cholinergic and adrenergic mechanisms in autonomic pharmacology; renal and endocrine pharmacology; control of lung vasculature and smooth muscle in respiratory pharmacology.

BMS 6468—Chemical Pharmacology (5) *Prereq: BMS 6400.* Chemical aspects of several areas of modern pharmacology, such as metablism of foreign compounds, structure-activity relationships, the biochemistry of drug activity.

BMS 7421—Research Methods in Pharmacology I (1) Readings, discussions, and practical experience with modern research methods used in pharmacology. Both instrumental and biological methods.

BMS 7422—Research Methods in Pharmacology II (1)

BMS 7423—Topics in Pharmacology (1-4; max: 12) Seminars, informal conferences, or laboratory work on the use of drugs in biochemical and physiological investigations.

BMS 7467—Physiology and Pharmacology of Excitable Membranes (3) Membrane ionic permeability changes underlying action and synaptic potential generation described in detail. Applications of electrophysiological and radioactive tracer techniques to analysis of drug action on excitable membranes.

PHARMACY
College of Pharmacy

GRADUATE FACULTY 1979-80

Chairman & Graduate Coordinator: M. A. Schwartz. *Graduate Research Professor:* E. R. Garrett. *Professors:* O. E. Araujo; C. H. Becker; K. F. Finger; J. H. Perrin; M. A. Schwartz; F. A. Vilallonga. *Associate Professors:* R. A. Angorn; F. P. Field; W. L. Harrison; M. A. Lemberger; W. C. McCormick; R. B. Stewart; G. Torosian. *Assistant Professors:* P. L. Doering; S. M. Johnson; C. C. Lee; M. W. McKenzie; M. P. Pevonka; J. Simpkins.

The College of Pharmacy offers Master of Science in Pharmacy and Doctor of Philosophy degrees in pharmaceutical sciences, with specialization in pharmacy.

Specific areas of specialization are pharmaceutics with research in biopharmaceutics and product formulation, pharmacy administration, clinical pharmacy, and hospital pharmacy administration.

New graduate students should have an adequate background in calculus and physical, organic, and analytical chemistry. A Bachelor of Science in Pharmacy and an interview are required for admission to the clinical pharmacy, hospital pharmacy administration, and pharmacy administration areas, while an undergraduate degree in pharmacy, chemistry, biology, or premedical sciences will be accepted in the other areas.

PHA 5121—Clinical Pharmacokinetics (4) *Prereq: PHA 4120 or by special arrangement.* Integrating and applying pharmacokinetic principles to formulate a rational dosage regimen considering patient factors such as age, renal and hepatic function, concurrent disease states and concomitant medications, and drug product factors including bioavailability, efficacy, toxicity and risk to benefit ratio.

PHA 5356—Cancer Chemotherapy (3) *Prereq: PHA 4350 and BCH 4203. Coreq: PHA 4436.* The chemotherapeutic agents which are currently in clinical use or under trial are classified according to their general mode action and are presented with their relevant chemical, pharmaceutical, and biological characteristics.

PHA 5508—Principles of Endocrinology (5) *Prereq: Course in physiology.*

PHA 6107C—Parenterals (5) Techniques of preparation, administration, and testing of materials designed for parenteral injection.

PHA 6115—Equilibria, Complexations, and Interactions of Drugs (5) *Prereq: CHM 4412; MAC 3314* or *MAP 5304.* Models for drug interactions in solution. Physical chemistry characteristics of drugs and their complexes in pharmaceutical systems.

PHA 6116—Stability and Kinetics of Drugs (5) *Prereq: CHM 6440, 6226, and PHA 6115.* Kinetics, mechanisms, and prediction of stability of *in vitro* transformations of drugs including alkaloids, vitamins, steroids, salicylates, and their pharmaceutical formulations; application of analog computer.

PHA 6125—Pharmacokinetics and Biopharmaceutics (5) *Prereq: PHA 6116 and a course in pharmacology, or by special arrangement.* In vivo transformations of drugs and compartmental analysis with analog computer; absorptions, transfer, protein binding, metabolism, excretion, receptor site interaction, and biological availability from the dosage form.

PHA 6146C—Pharmaceutical Equipment and Machinery (4) Industrial pharmaceutical machinery and equipment such as colloid mills and homogenizers, sifters, pulverizers, centrifuges, tablet machines and ampul washers, fillers, and sealers. Manufacture of pharmaceutical products on a pilot-plant scale in the laboratory.

PHA 6147C—Pharmaceutical Machinery and Product Formulation (4) Continuation of PHA 6146C with rationale and design of some pharmaceutical dosage forms, particularly on inherent physical and chemical problems, stability and biopharmacy. Selected formulas prepared for evaluation on a laboratory and pilot-plant scale.

PHA 6148C—Pharmaceutical Product Formulation (4) Continuation of PHA 6147C. Rationale and design of some pharmaceutical dosage forms, such as inherent physical and chemical problems, stability, and biopharmacy. Selected formulas prepared for evaluation on a laboratory and pilot-plant scale.

PHA 6155—Hospital Pharmacy Seminar (1) Required of hospital pharmacy residents, but not more than three credits are allowed. Oral reports related to hospital pharmacy. Discussion of problems.

PHA 6225—Hospital Pharmacy Administration (3) Development, functions, responsibilities, organization, and administration of the hospital and the hospital pharmacy department. Viewpoint of administrative responsibilities of the hospital pharmacist.

PHA 6235—Advanced Pharmaceutical Law (5) History, philosophy, requirements, administration, and enforcement of the Federal Food, Drug and Cosmetic Act and various state and local laws applicable to manufacturers, wholesalers, and other distributors of drugs and drug-related products, with analyses of recent court decisions.

PHA 6236—Health Sciences Liability Law (3) Liability of health sciences practitioners, including hospitals, physicians, pharmacists, nurses, medical technologists, and dentists.

PHA 6237—Pharmaceutical Law Seminar (1; max: 3) Selected recent cases and materials having impact on the drug industry, health professions, health-care services, and consumers with respect to the effects of these new decisions on socioeconomics and public health.

PHA 6790—Drug Information (4) Survey of drug information sources; analysis; evaluation and communication of drug data; and survey of manual and automated drug information resources. Provides practical experience in the College of Pharmacy's statewide Drug Information Service and will include discussions concerning its operation and administration.

PHA 6905—Research Methods in Pharmaceutical Sciences (2-6) *Prereq: MAC 3312, CHM 4410.* Students acquire proficiency in research techniques and instrumentation used in

physical pharmacy, drug stability, kinetics, and pharmacokinetics, under supervision of a staff member.
PHA 6910—Supervised Research (1-5)
PHA 6935—Selected Topics in Pharmacy (3)
PHA 6936—Advanced Topics in Pharmaceutical Sciences (1-2; max: 6) Oral reports on the pharmaceutical sciences; discussion and critical review of such topics; written and oral presentations of research designs, protocols, papers, and critical appraisals.
PHA 6937—Topics in Pharmaceutical Administration (3) Analysis of special topics and recent developments in pharmaceutical administration, including innovations in the distribution of drugs and health-care services such as third-party prescription payment plans and extended health-care facilities.
PHA 6940—Supervised Teaching (1-5)
PHA 6971—Research for Master's Thesis (1-15)
PHA 7980—Research for Doctoral Dissertation (1-15)

PHILOSOPHY
College of Liberal Arts and Sciences

GRADUATE FACULTY 1979-80

Chairman: E. S. Haring. *Graduate Coordinator:* R. P. Haynes. *Professors:* E. S. Haring; A. L. Lewis, Jr.; H. Mehlberg *(Emeritus);* J. J. Zeman. *Associate Professors:* T. P. Auxter; R. D'Amico; R. P. Haynes; M. G. Holly; T. W. Simon.

The Department offers programs leading to the Master of Arts, Master of Arts in Teaching, and Doctor of Philosophy degrees.

PHH 5135—Studies in Early Greek Philosophy (4; max: 12) Examination of the first, i.e., pre-Socratic, stages of Western philosophy—with some reference to both cultural context and later influence.
PHH 5206—Studies in Medieval Philosophy (4; max: 12) Representative works from the period c. 400-1400.
PHH 5406—Studies in Modern Philosophy (4; max: 12) Dominant themes and representative figures from the modern period.
PHH 5505—Studies in 19th-Century Philosophy (4; max: 12) One or more figures or schools of thought from the post-Kantian period.
PHH 5645—Studies in Phenomenology I (4; max: 12) Theory and practice of phenomenology as a philosophical method.
PHH 5646—Studies in Phenomenology II (4; max: 12) Major writings of one or more phenomenologists.
PHH 6069—Seminar on Themes in Classical/Medieval Philosophy (5; max 15)
PHH 6106—Seminar in Ancient Philosophy (5; max: 15)
PHH 6405—Seminar in Modern Philosophy (5; max: 15)
PHH 6509—Seminar in 19th-Century Philosophy (5; max: 15)
PHH 6649—Seminar in 20th-Century European Philosophy (5; max: 15)
PHI 5136—Graduate Symbolic Logic (5; max: 15) *Prereq: PHI 3130.* Advanced deductive techniques. Detailed consideration of formal systems and related topics.
PHI 5225—Studies in Philosophy and Linguistics (4) Methodological approaches to language and philosophical issues in linguistics.
PHI 5365—Studies in Theory of Knowledge (4; max: 12) Examination of positions and issues, usually with a contemporary emphasis.
PHI 5405—Studies in Philosophy of Science (5; max: 15) Examination of contrasting positions relating to physical and/or biological and/or social science.
PHI 5505—Studies in Metaphysics (4; max: 12) Examination of positions and issues, usually with a contemporary emphasis.
PHI 5685—Studies in Theory of Value (4; max: 12) Examination of positions and issues, usually with a contemporary emphasis.
PHI 5705—Studies in the Philosophy of Religion (4; max: 12) Examination of positions and issues, usually with a contemporary emphasis.
PHI 5807—Studies in the Philosophy of Art (4; max: 12) Exploration of one or more issues concerning the function of art, the role of artists, and the relation of different arts to one another.
PHI 5905—Individual Work (1-5; max: 15) *Prereq: 12 hours work in philosophy and consent of department.*
PHI 5934—Graduate Special Topics (1-4; max: 12) An occasional course offered according to current interests of the faculty.
PHI 6105—Seminar in Logic (5; max: 15)
PHI 6325—Seminar in the Philosophy of Mind (5; max: 15)
PHI 6426—Seminar in Epistemology and Social Theory (5; max: 15)
PHI 6456—Psychology and Philosophy of Science (5; max: 15)
PHI 6686—Seminar in Problems of Value (5; max: 15)
PHI 6806—Seminar in the Philosophy of Art (5; max: 15)
PHI 6905—Individual Work (1-5; max: 15)
PHI 6910—Supervised Research (1-5)
PHI 6934—Special Topics (1-5)
PHI 6940—Supervised Teaching (1-5)
PHI 6971—Research for Master's Thesis (1-15)
PHI 7980—Research for Doctoral Dissertation (1-15)
PHM 5505—Advanced Philosophy of History (4; max: 12) Investigation of controversial topics releated to history; e.g., explanation, general laws, objectivity, and relativism. One or more classical theories of history examined.
PHM 5520—Studies in Philosophy of Culture (4; max: 12) Contemporary philosophic perspectives on the nature and formation of culture.
PHP 5005—Studies in Plato (4; max: 12) Intensive study of at least one major dialogue together with related writings.
PHP 5015—Studies in Aristotle (4; max: 12) Advanced introduction to central theories and themes.
PHP 5415—Studies in Kant (4; max: 12) One or more of Kant's major philosophical works.
PHP 5781—Studies in Pragmatism (5; max: 15) Consideration of the extent to which the work of Peirce, James, Dewey, Mead, and Lewis forms an organized philosophical position.
PHP 5785—Studies in Analytic Philosophy (4; max: 12) One or more major works or themes in recent British-American philosophy.
PHP 6419—Seminar on Kant (5; max: 15)
PHP 6783—Seminar in Phenomenology (5; max: 15)
PHP 6785—Seminar in Analytic Philosophy (5; max: 15)

PHYSICS
College of Liberal Arts and Sciences

GRADUATE FACULTY 1979-80

Acting Chairman: C. F. Hooper, Jr. *Graduate Coordinator:* B. S. Thomas. *Graduate Research Professors:* A. E. S. Green; P. O. Lowdin. *Distinguished Service Professor:* S. S. Ballard. *Professors:* E. D. Adams; T. L. Bailey; J. S. Blakemore;* A. A. Broyles; C. R. Burnett;* T. D. Car; J. R. Cox;* J. W. Dufty; F. E. Dunnam; J. W. Flowers; R. E. Garrett; C. F. Hooper, Jr.; B. Lamborn;* J. B. McGuire;* D. A. Micha; A. H. Nevis; N. Y. Ohrn; G. C. Omer, Jr.; R. Pepinsky; L. R. Peterson; J. R. Sabin; T. A. Scott; A. G. Smith; R. F. Stetson;* H. A. Van Rinsvelt; H. R. Weller. *Associate Professors:* R. A. Blue; J. R. Brookeman; S. W. Bruenn;* J. R. Buchler; J. B. Conklin, Jr.; G. R. Lebo; M. A. Lynch; H. J. Monkhorst; B. S. Thomas; S. B. Trickey. *Assistant Professors:* W. L. Chameides; G. G. Ihas.

**These members of the faculty of Florida Atlantic University are also members of the graduate faculty of the University of Florida and participate in the doctoral degree program in the University of Florida Department of Physics.*

The Department of Physics offers the Master of Science (thesis or nonthesis option) and the Doctor of Philosophy degrees. The nonthesis degree Master of Science in Teaching is also available. A wide choice of research specialties is offered. A program in chemical

physics, under the direction of faculty members from the Physics, Chemistry, and Chemical Engineering Departments, is available for those students who wish to prepare themselves for the study of chemical problems using physical methods.

The course including PHY 6246, 6346, 6347, 6536, 6537, 6645, 6646, 6647, and 7348 are designed to provide graduate students with a solid background in basic physics. Doctoral students will usually take all of these core courses and upon their completion (which normally requires four quarters) are expected to take the qualifying examination. Students who are unprepared for the above courses may take the appropriate 5000-level courses in the department. Master's degree candidates must take at least six courses numbered 6000 or above.

AST 6165—Radiopropagation and Ionospheric Physics I (3) *Prereq: PHY 4324.* Propagation of electromagnetic waves in magnetoionic media, with emphasis on the terrestrial ionosphere, and cosmic conditions such as solar corona and interstellar media.

AST 6166—Radiopropagation and Ionospheric Physics II (3) *Prereq: AST 6165.* Ionospheric electron density and ion composition profiles; diurnal, seasonal, and global variations; presunrise effects; electron and ion temperatures; solar flare and magnetic storm effects.

AST 6167—Atomic Physics of Planetary Atmospheres (3) *Prereq: basic physics course and mathematics courses through integral calculus.* Atomic and quantum theory, quantum mechanics and the central field problem, atomic and molecular spectroscopy, collisional cross sections for aeronomy.

AST 6168—Physics of the Earth's Upper Atmosphere (3) *Prereq: AST 6167.* Solar-terrestrial relations, aurora, airglow, and ionospheric phenomena. Remote sensing of atmospheric emissions and scattered solar radiation.

AST 6169—Physics of Planetary Atmospheres (3) *Prereq: AST 6168.* Radiative transfer in planetary atmospheres, from x-ray to radio regions. Discussion of recent studies of the atmospheres of Venus, Mars, Jupiter, and other planets.

PHS 5204—Optical Spectra (3) *Prereq: PHY 3123 or equivalent.* Vector models and spectra of atoms and diatomic molecules, continuous spectra. Applications of spectra intensities and line widths to the analysis of plasmas and stellar atmospheres.

PHS 5254—Light and Biological Systems (3) *Prereq: PHY 2042 or 2052, CHM 3200 or 3210; also PHY 3423 for physics majors.* Physics of radiation and matter, quantum processes; applications to studies of biological photoprocesses at the molecular level.

PHS 5255—Molecular Biophysics of Sensory Receptors I (3) *Prereq: permission of instructor.* Sensory cell biomembranes, antennae, synapses; visual receptor pigments, receptor cells and their specialization; biophysics of hearing, hair cells in vertebrates, sensilla in insects.

PHS 5256—Molecular Biophysics of Sensory Receptors II (3) *Prereq: permission of instructor.* Biophysics of chemo-reception; evolution and mechanisms of gravity-sensitive systems in plants and animals; mechanisms of response to localized mechanical stimuli; theories and some biophysics of electro- and magneto-sensitivity; infrared sensors in snakes.

PHS 5257—Seminar in Biophysics (2) *Prereq: permission of instructor.*

PHS 5304—Nuclear Physics (3) *Prereq: PHY 4124.* Static properties of nuclei, descriptive aspects of radioactivity and nuclear reactions, nuclear systematics, nuclear models, and nuclear forces.

PHS 5331L—Laboratory Techniques in Nuclear Physics (2) *Prereq: PHS 4330L.* Special and advanced topics in nuclear instrumentation and methods.

PHS 5354—Introduction to Particle Physics (3) Particle states, conserved quantum numbers, invariance principles.

PHS 5404—Introductory Solid-State Physics (3) *Prereq: PHY 5624.* General introduction to solid-state physics for nonspecialists. Crystal structure; thermal, electrical, and magnetic properties of solids.

PHS 6156—Computer Methods in Physics (3) *Prereq: PHY 5624; an elementary knowledge of Fortran programming.* Numerical techniques useful in solving physical problems. Aspects of advanced Fortran programming. Use of the computer.

PHS 6209—Theory of Optical Spectra (3) *Prereq: PHY 6647.* Theory of angular momentum applied to the structure and spectra of atoms.

PHS 6225—Quantum Theory of Matter I (3) *Prereq: PHY 5624 or CHM 6470.* Quantum mechanics of atoms. Hartree-Fock theory. Interaction of radiation and matter. Relativistic theory.

PHS 6226—Quantum Theory of Matter II (3) *Prereq: PHS 6225.* Diatomic and polyatomic molecules. Symmetry properties and group theory.

PHS 6227—Quantum Theory of Matter III (3) *Prereq: PHS 6226.* Special topics in the quantum theory of atoms, molecules, and solids.

PHS 6247—Chemical Physics (3) Interatomic and intermolecular forces. Energy transfer and reaction in molecular collision processes. Computational aspects of scattering theory.

PHS 6326—Theoretical Foundations of Nuclear Physics (3) Schrodinger's equation and the independent particle model of the nucleus, velocity-dependent potentials, relations of IPM to resonances, doorway states, direct reactions, the N-N interactions, and nuclear structure.

PHS 6336—Experimental Foundations of Nuclear Physics I (3) *Prereq: PHY 6647.* Radioactivity, radiation detection, nuclear decay, accelerators, basic nuclear reaction studies. Nuclear spectroscopy.

PHS 6337—Experimental Foundations of Nuclear Physics II (3) *Prereq: PHS 6336.* Nuclear structure, with emphasis on information obtained through nuclear reactions. Application of experimental results to various nuclear models. Scattering.

PHS 6391—Seminar in Experimental Nuclear Physics (1; max: 20) Current literature of nuclear-structure physics from an experimental viewpoint.

PHS 6493—Seminar in Experimental Low-Temperature Solid-State Physics (1; max: 20) Recent developments in low-temperature solid-state physics.

PHS 6606—Special Relativity (3) Introduction to Einstein's special theory of relativity employing tensor analysis, general invariance and the background of the general theory of relativity.

PHS 6616—General Relativity (3) Einstein's general theory of relativity and relativistic cosmology.

PHS 7228—Theory of Atomic and Molecular Structure I (3) *Prereq: PHS 6227.* Mathematical techniques used in atomic, molecular, and solid-state theory. The one-electron approximation and the general quantum-mechanical many-body problem. Selected advanced topics.

PHS 7229—Theory of Atomic and Molecular Structure II (3) *Prereq: PHS 7228.*

PHS 7236—Atomic and Molecular Collisions I (3) *Prereq: PHY 6647.* Classical and quantum theories of collisions of atoms and molecules, with emphasis on low-energy collisions. Approximate theoretical methods and recent experimental developments.

PHS 7237—Atomic and Molecular Collisions II (3) *Prereq: PHS 7236.*

PHS 7327—Theory of Nuclear Spectroscopy (3) *Prereq: PHS 6326.* Racah algebra; single particle shell model; two, three, or more particle systems; electromagnetic properties of nuclei.

PHS 7357—High Energy Theory I (3) *Prereq: PHY 6668.* Field theory, particles, scattering theory, LSZ theory.

PHS 7358—High Energy Theory II (3) *Prereq: PHS 7357.* Dispersion theory, form factors, current topics.

PHS 7426—Physics of the Solid State I (3) *Prereq: PHY 6536, 6537, 6646.* Band theory and symmetry properties.

PHS 7427—Physics of the Solid State II (3) *Prereq: PHS 7426.* Photons, transport properties, and electron dynamics.

PHS 7428—Physics of the Solid State III (3) *Prereq: PHS 7427.* Magnetism.

PHY 5225—Intermediate Dynamics (3) *Prereq: PHY 4224.* Kinematics of two-particle collisions, motion in noninertial

reference frames, dynamics of rigid bodies, small oscillations, vibrating strings, and the wave equation.

PHY 5325—Electric and Magnetic Fields (3) *Prereq: PHY 4324.* Solutions to Maxwell's equations, including selected topics relating to static and dynamic electric and magnetic fields, and an introduction to the emission and propagation of electromagnetic waves.

PHY 5445—Classical and Modern Optics (4) *Prereq: PHY 4324 and 4424 or equivalents.* Advanced course in physical optics; includes such modern topics as coherence, lasers, holography, and nonlinear optics.

PHY 5524—Fundamentals of Statistical Physics II (3) *Prereq: PHY 4523.*

PHY 5624—Modern Physics III (3) *Prereq: PHY 4124 or equivalent.* Introduction to quantum mechanics, with emphasis on atomic structure.

PHY 5722C—Electronics I (3) *Prereq: PHY 3323 or equivalent.* Experiments include vacuum thermionic emission, gas and solid-state conduction, properties of amplifers and related circuits.

PHY 5723C—Electronics II (3) *Prereq: PHY 5722C.*

PHY 5905—Individual Work (3-5; max: 15) Assigned reading program; special topics, or development of a special experimental problem. Work selected to meet the needs and interests of the student.

PHY 6077—Electrical Activity of the Nervous System (3) *Prereq: MAP 3302, PHY 4712L or EEL 3135. Coreq: PHY 4523.* Analysis of the electrical signals of peripheral nerve and brain, with application of systems engineering techniques.

PHY 6078—Biophysical Models of Nerve Impulse Propagation (3) *Prereq: PHY 6077.* Analysis of chemical, electrical, hydrodynamic, and solid-state models of axonic and synaptic nerve transmission.

PHY 6246—Classical Mechanics (3) Review of Lagrangian mechanics; special relativity, Hamiltonian mechanics, canonical transformations, Hamilton-Jacobi theory, action angle variables, mechanics of continuous media.

PHY 6346—Electromagnetic Theory I (3) Electrostatics, magnetostatics, and Maxwell's equations.

PHY 6347—Electromagnetic Theory II (3) *Prereq: PHY 6346.* Diffraction, radiation theory, covariant formulation of electromagnetic theory.

PHY 6536—Statistical Physics I (3) *Prereq: PHY 6246.* Gamma and mu spaces, ergodic theory, Liouville equation, B-B-G-K-Y hierarchy, Boltzmann equation, Euler's equations, ensemble theory, application of ensemble theory to ideal and imperfect gases.

PHY 6537—Statistical Physics II (3) *Prereq: PHY 6536, 6645.* Foundations of quantum statistical physics, Liouville-Von Neumann equation, quantum nonequilibrium problem, quantum ensembles, Slater sum, density matrices, applications of ensemble theory to quantum systems.

PHY 6556—Low Temperature Physics (3) *Prereq: PHY 6646.* Methods of producing and measuring low temperatures. Experimental and theoretical aspects of quantum liquids and solids (He-3 and He-4) and superconductivity.

PHY 6645—Quantum Mechanics I (3) *Prereq: MAS 5156, MAP 5304, PHY 5624.* The Schrodinger equation. WKB approximation, properties of operators and eigenfunctions, matrices, angular momentum, hydrogen atom.

PHY 6646—Quantum Mechanics II (3) *Prereq: PHY 6645.* Variational principle, elementary perturbation theory, degenerate perturbation theory. Dirac notation and spin. Quantum theory of measurement.

PHY 6647—Quantum Mechanics III (3) *Prereq: PHY 6646.* Scattering theory, identical particles, quantized amplitudes, positron hole theory, addition of angular momentum, symmetry principles. Topics may be shifted among PHY 6645, 6646, and 6647.

PHY 6648—Relativistic Quantum Mechanics (3) *Prereq: PHY 6647.* The inhomogeneous Lorentz group. One-particle relativistic wave equations for spins 0, ½, and 1 and their Green's functions (Feynman propagators). Photon-electron interaction and Feynman diagrams.

PHY 6668—Quantum Field Theory (3) *Prereq: PHY 6648.* Feynman diagrams, Fock-space wave functions and differential equations, Dyson's equations, renormalization, the Bethe-Salpeter equation, and the hydrogen atom.

PHY 6669—Applications of Quantum Field Theory (3) *Prereq: PHY 6648, 6668.* Applications of the theory including scattering by atoms, the Compton effect, pair annihilation, the Lamb shift, and quantum field operators.

PHY 6905—Individual Work (3-5; max: 18) Assigned reading program or development of an assigned experimental problem. Work selected to meet the needs and interests of the student.

PHY 6910—Supervised Research (1-5)

PHY 6920—Departmental Seminar (1) Physics, astrophysics, and astronomy topics presented by local staff members and visiting scientists. S/U.

PHY 6935—Seminar in Modern Physics (1; max: 20) Recent developments in theoretical and experimental physics S/U.

PHY 6940—Supervised Teaching (1-5)

PHY 6971—Research for Master's Thesis (1-15)

PHY 7097—Advanced Topics in Theoretical Physics (4; max: 16) Special studies in the application of the various theoretical/mathematical methods to physical problems, with emphasis on problems of current interest.

PHY 7098—Advanced Topics in Experimental Physics (4; max: 16) Application of advanced techniques to the solution of various experimental problems, including instrument design and data analysis.

PHY 7247—Advanced Classical Mechanics (3) *Prereq: PHY 6246.* Rigid rotators; elasticity; vibrations, normal modes, waves.

PHY 7348—Advanced Electromagnetic Theory (3) *Prereq: PHY 6347.* Special topics. Content varies, but may include radiation reaction, Lineard-Wiechert potentials, Cerenkov effect, nonlinear optics.

PHY 7538—Advanced Statistical Mechanics I (3) *Prereq: PHY 6537.* Irreversible processes, many-body problems, Ising model, cluster expansions, phase transitions.

PHY 7539—Advanced Statistical Mechanics II (3) *Prereq: PHY 7538.*

PHY 7939—Special Topics (3; max: 18) Assigned reading program, seminar, or lecture series in a new field of advanced physics.

PHY 7980—Research for Doctoral Dissertation (1-15)

PHYSIOLOGY
College of Medicine

GRADUATE FACULTY 1979-80

Acting Chairman: A. B. Otis. *Graduate Coordinator:* M. J. Fregly. *Graduate Research Professor:* M. J. Fregly. *Professors:* D. F. Barron; S. Cassin; W. W. Dawson; M. J. Jaeger; A. B. Otis; W. N. Stainsby. *Associate Professors:* F. P. Field; J. B. Munson; P. Posner. *Assistant Professors:* M. J. Fisher; G. A. Gerencser; J. F. Metcalf; W. W. Nichols.

The Department of Physiology offers a program leading to the degrees of Master of Science and Doctor of Philosophy in the medical sciences with specialization in physiology.

Areas of specialization within the Department of Physiology include sensory physiology, endocrinology, respiration, circulation, physiology of muscle, environmental physiology, comparative physiology, and neonatal physiology.

Undergraduate majors appropriate as foundations for the study of physiology are biology, chemistry, engineering, mathematics, or physics. The following courses are especially useful as a background for the study of physiology: general biology, vertebrate biology, general chemistry, analytical chemistry, organic chemistry, physical chemistry, general physics, calculus, and statistics. Students may find it necessary to remedy deficiencies in their background by taking undergraduate courses after admission to Graduate School.

BMS 5511—Vision (4) *Prereq: consent of instructor.* Introduction to methodology, anatomy, and function of vision.

BMS 5520C—Principles of Physiology (9) *Prereq: APB 3203 or equivalent.* Physiology of mammalian organ systems, with special reference to the human.
BMS 5520L—Laboratory in Physiology (2) *Coreq: BMS 5520.* Laboratory course designed to illustrate the principles of physiology. Students perform exercises coordinated with course topics under discussion in BMS 5520.
BMS 6512—Survey of Sensory Systems (4) *Prereq: BMS 6510.* Theories and data on human sensory reception and encoding. Audition, vision, and the chemical and cutaneous senses.
BMS 6535—Seminar in Physiology (1) S/U.
BMS 6536—Recent Advances in Physiology (3; max: 15) Content varies from year to year but covers recent advances in physiology.
BMS 6537—Seminar on Vision (4) Current research and theory in visual function. Literature survey and design of an experiment relevant to recent theory.
BMS 6560C—Research Methods in Physiology (2-6; max: 9) Special needs of each student are met by conferences and laboratory work.
BMS 6573—Physiology of Respiration (3) Gas exchange in lungs and tissues. Ventilatory mechanics. Respiratory functions of body fluids. Physiological regulations. Comparative physiology of respiratory mechanisms.
BMS 6574—Physiology of the Circulation of Blood (3) Physiology of the component parts of the circulation, relation of structure and function, emphasis on control mechanisms.
BMS 6575—Renal Physiology (3) Seminars on the comparative physiology, aspects of renal structure and function.
BMS 6576—Body Temperature Regulation (3) Neural and endocrine aspects of temperature regulations, hypo- and hyperthermia, adaptation to cold and heat, hibernation. Comparative physiology of temperature regulation stressed.
BMS 6577—Neonatal Physiology (3) Physiological regulation in newborn mammals.
BMS 6578—Physiology of the Mammalian Thyroid Gland (3) Production, secretion, control, and function of thyroid hormones; interaction with other hormones.
BMS 6579—Gastrointestinal Physiology (3) Structure and basic functions of the vertebrate gastrointestinal system. Review of basic transport processes, physiology of the salivary glands, control of gastric secretion and digestion by the stomach, digestion and absorption by the small intestine, physiology of the pancreas and liver, muscular movements of the gastrointestinal system.
BMS 6933—Sensory Science Seminar (1) Results of current investigations in sense organ function will be covered. S/U.
BMS 7467—Physiology and Pharmacology of Excitable Membranes (3) Membrane ionic permeability changes underlying action and synaptic potential generation described in detail. Applications of electro-physiological and radioactive tracer techniques to analysis of drug action on excitable membranes.
BMS 7570—Basic Cardiac Electrophysiology (3) Basic introduction to cardiac electrophysiology and current research and techniques on genesis and control of cardiac cell potentials.
BMS 7571—Cardiac Electrophysiology (3) Study of the normal electrophysiology and ionic mechanisms involved in various regions of the heart.
BMS 7572—Electrophysiological Basis of Cardiac Dysrhythmias (3) Study of normal cardiac cellular electrophysiology and changes which result in cardiac dysrhythmias. New techniques in diagnosis and management of dysrhythmias.

PLANT PATHOLOGY
College of Agriculture

GRADUATE FACULTY 1979-80

Acting Chairman: T. E. Freeman. *Graduate Coordinator:* L. F. Jackson. *Professors:* R. D. Berger; G. F. Brown; A. A. Cook; T. E. Freeman; J. P. Jones; J. W. Kimbrough; H. H. Luke; D. R. Pring; D. E. Purcifull; L. H. Purdy; D. A. Roberts; N. C. Schenck; R. A. Schmidt; R. E. Stall; F. W. Zettler. *Associate Professors:* J. A. Bartz; R. Charudattan; W. J. French; S. M. Garnsey; E. Hiebert; J. F. Knauss; T. A. Kucharck; R. E. McCoy; R. T. McMillan; J. W. Miller; D. J. Mitchell; R. M. Sonoda; J. O. Strandberg; R. B. Volin; D. P. Weingartner. *Assistant Professors:* G. M. Blakeslee; L. F. Jackson; K. L. Pohronezny; W. H. Ridings.

The Department of Plant Pathology offers graduate studies leading to the Master of Agriculture, Master of Science, and Doctor of Philosophy degrees. A superior student with a baccalaureate degree may begin graduate study toward a higher degree in the basic areas of plant pathology. These areas include biochemical aspects of host-pathogen systems, epidemiology, etiology, genetics of host-pathogen systems, and pathogen taxonomy. The diversity of cropping sequences coupled with an environment ideal for plant disease development in Florida is unexcelled and offers the student opportunities of study with diseases of unique crops as well as diseases of crops of national and international importance. Intimate knowledge can be gained of diseases of field, forage, forest, fruit, ornamental, pasture, range, turf, and vegetable crops in temperate, subtropical, and tropical environments. Students who anticipate study in plant pathology at the University of Florida should include in their undergraduate programs, training in botany (anatomy, cytology, physiology, systematics), chemistry, (through organic), introductory microbiology, physics, zoology, and mathematics.

After completing PLP 5032 in the first or second quarter of residence, all students will be given an oral examination covering the general and specialized areas of plant pathology. Course requirements will be determined for each individual based on their performance on the examination as well as their background and objectives.

The Departments of Botany and Entomology and Nematology offer courses in, respectively, mycology and nematology.

PLP 5032—Intermediate Plant Pathology (3) *Enrollment limited to students whose major or minor field is plant pathology. Prereq: PLP 3002 or equivalent.* Lives and times of 10 destructive plant parasites.
PLP 5053—Tropical Plant Pathology (4) *Prereq: PLP 3002 or consent of instructor.* Important diseases of major crops grown in tropical/subtropical countries in both commercial and subsistence agriculture.
PLP 6223—Plant Virology (5) *Prereq: PLP 3002.* Principles of plant virology; symptomatology, transmission, insect vector relationships, properties of viruses, purification, electron microscopy, morphology, serology, and control of viral diseases.
PLP 6224—Advanced Plant Virology (4) *Prereq: PLP 6223 and consent of instructor.* Methods of research in plant virology.
PLP 6241—Bacterial Plant Pathogens (5) *Prereq: PLP 3002, MCB 3020.* Plant pathogenic bacteria, with emphasis on bacteriological problems unique in plant pathology.
PLP 6262—Fungal Plant Pathogens (5) *Prereq: PLP 5032, BOT 5435C.* Diseases caused by fungi, emphasizing taxonomy and variability of the pathogen, symptomatology, host responses to infection, and factors influencing disease development.
PLP 6281—Field Plant Pathology (3) *Prereq: PLP 3002 or equivalent.* Examination of Florida plant diseases, with field trips to observe the predominant diseases of economic crops in most agricultural production areas.
PLP 6291—Plant Disease Diagnosis (2) *Prereq: PLP 3002, BOT 5435C.* Methods used in diagnosing plant diseases caused by fungi, bacteria, viruses, and inanimate conditions.
PLP 6303—Physiology of Parasitism (5) *Prereq: PLP 3002.* Physiological aspects of the host-pathogen interaction in plant diseases.

PLP 6404—Epidemiology of Plant Disease (5) *Prereq: PLP 3002.* Principles of ecology of plant diseases with emphasis on the effects of the climatic environment on the development of disease in populations of plants and the implications with regard to the strategy of disease control.
PLP 6502—Pathogen Variability and Host Resistance (5) *Prereq: PLP 4102, PLP 5032, BOT 5435C, AGR 4321, MCB 3020.* Mechanisms by which pathogens vary; variability of pathogen populations in relation to utilization of plant germ plasm for disease control.
PLP 6622C—Biology, Ecology and Taxonomy of Mycorrhizae (5) *Prereq: basic courses in botany, and plant pathology or equivalent. Coreq: basic course in mycology.* A survey of the taxonomy, morphology and ecology of organisms forming plant mycorrhizae and the biological, and physiological effects and economic aspects of mycorrhizae on plants.
PLP 6905—Problems in Plant Pathology (1-5; max: 9) Study of any field of plant pathology including diseases of all major crop groups.
PLP 6910—Supervised Research (1-5)
PLP 6921—Colloquim in Principles of Plant Pathology (1; max: 6)
PL 6931—Seminar in Plant Pathology (1) Discussion of the literature, techniques, and research pertaining to plant pathology. S/U.
PLP 6940—Supervised Teaching (1-5)
PLP 6971—Research for Master's Thesis (1-15)
PLP 7980—Research for Doctoral Dissertation (1-15)

POLITICAL SCIENCE
College of Liberal Arts and Sciences

GRADUATE FACULTY 1979-80

Chairman: A. B. Clubok. *Graduate Coordinator:* D. P. Conradt. *Distinguished Service Professor:* M. J. Dauer. *Professors:* E. R. Bartley; A. B. Clubok; D. P. Conradt; J. M. DeGrove;* D. S. Gatlin;* R. J. Huckshorn;* K. R. Legg; R. Lemarchand; O. R. McQuown; W. A. Rosenbaum; J. W. Spanier; A. Suarez; B. E. Swanson; V. A. Thompson; J. E. Vincent.* *Associate Professors:* J. W. Button; A. J. Damico; M. W. Giles;* W. A. Kelso; T. L. McCoy; J. F. Morrison; R. K. Scher; E. R. Wittkopf. *Assistant Professors:* M. A. Maggiotto; D. M. Stetson;* G. C. Wright, Jr.*

**These members of the faculty of Florida Atlantic University are also members of the graduate faculty of the University of Florida and participate in the doctoral degree program in the University of Florida Department of Political Science.*

The Department of Political Science offers the Master of Arts degree with both a thesis and a nonthesis option and the Doctor of Philosophy degree in political science or international relations. The Master of Arts in Teaching degree is also offered with a major in political science or international relations.

The areas of specialization offered by the department for the Ph.D., M.A., and M.A.T. include American government and politics, comparative politics, international relations, public administration, public law, political theory, interdisciplinary urban problems, and methodology. In addition, the department's offerings include work taken in cooperation with the Center for African Studies and with the Center for Latin American Studies. Programs composed from these areas can be used to prepare students for careers in teaching, research, and government service. The department also offers a specialized M.A. program in political science with an emphasis in public administration.

Admission to graduate study in the Department of Political Science normally requires the completion of an undergraduate major in political science or its equivalent. Students without this preparation will be required to make up deficiencies early in their graduate work. All degree programs, except for the special program emphasizing public administration, require evidence of a year of satisfactory work in an approved foreign language.

International Relations, a field of specialization leading to the M.A. and Ph.D. degrees, is offered in programs through the Department of Political Science. For the M.A. the requirements are 45 credit hours with thesis or 54 credit hours without thesis. For the Ph.D. the student has the option of taking 1) four fields of political science and a single or composite minor, or 2) three fields of political science (plus two graduate courses in a fourth field) and two minor fields or a composite minor.

Public Administration. The curriculum consists of seminars in planning, public administration, and public law and recommended courses in statistics, accounting, economics, sociology, geography, and public works engineering. Supervised internships in selected agencies in Florida are arranged by the Department of Political Science as an integral part of the training program. The program requires 60 hours of course work. There is no foreign language requirement.

Law/Public Administration Joint Degree Program. A four-year program leading to a Juris Doctor and a Master of Arts in political science—public administration is offered under the joint auspices of the Graduate School (College of Liberal Arts and Sciences, Department of Political Science) and the College of Law. The program provides students interested in law and public service with the opportunity to blend relevant work in public administration, political science, and law. Students must meet the entrance requirements of both the College of Law and the graduate program in political science—public administration. A thesis is not required. Interested students should apply to both the Holland Law Center and to the Graduate School, noting on the application the joint nature of their admission request. Alternatively, students may apply to the Graduate School during their first year of Law School. Further information on the program is available from the Holland Law Center and from the Department of Political Science.

Study for the Ph.D. degree in political science at the University of Florida by qualified master's degree recipients at Florida Atlantic University is facilitated by a cooperative arrangement in which appropriate members of the faculty of FAU are members of the graduate faculty of the University of Florida.

For further information and detailed requirements, prospective students are invited to write for the departmental brochure on graduate programs in political science.

CPO 5065—Eastern European Communist States (5)
CPO 5105—Western European Politics (5)
CPO 5145—Politics in Post-Industrial Societies (4)
CPO 5305—Political Systems of Latin America: Modernization, Authoritarianism, Revolution (5) *Prereq: CPO 3303 or equivalent.* A comparative analysis of political responses to modernization in Latin America. Emphasis on authoritarian regimes in Argentina and Brazil and the role of revolution in Mexican and Cuban development.
CPO 5306—Contemporary Problems in Latin American Politics (5) *Prereq: CPO 3303 or 5305 or equivalent.* Intensive analysis of major themes and issues in the study of Latin American politics; the breakdown of democratic systems, dependency and imperialism, revolutionary movement and regimes. Offered with changing content.
CPO 5636—Politics in the Soviet Union and Eastern Europe (5)

CPO 6036—Politics in Developing Societies (4) Comparative analysis of political and administrative problems confronting less developed political systems.
CPO 6037—Political Development (3) A review and analysis of major theoretical formulations of political development.
CPO 6041—Politics in Advanced Industrial Societies (4) Comparative analysis of typical political, economic, and social problems confronting governments of advanced industrial states.
CPO 6307—Latin American Politics I (4) Knowledge of Spanish or Portuguese is required; French may be substituted with consent of instructor.
INR 5207—Comparative Foreign Policy (5) *Prereq: INR 2002.* Intensive study of special topics in international relations and foreign policy such as broad-based comparative analysis of foreign policy behavior, comparative international subsystems, reinterpretation of concepts such as nationalism and imperialism.
INR 5245—International Politics of Latin America (5) *Prereq: INR 2002 or advanced standing in Latin American Studies.* Intensive analysis of the international politics of Latin America. Relations with U.S. and nonhemispheric powers. Foreign policies of Latin American states.
INR 5334—American Military Strategy (5)
INR 5505—International Institutions (5) *Prereq: INR 2002, 4403.* In-depth analysis of the political and functional aspects of international organization and administration, alternating emphasis on either global organizations such as the United Nations or regional organizations such as the European Economic Community.
INR 6208—Foreign Policy (4)
INR 6607—International Relations Theory (4) Basic forces, problems, and developments in international politics and organization.
PAD 5035—Problems of Administration and Policy (5) *Prereq: PAD 4003.*
PAD 5807—Urban Administration (5)
PAD 6026—Public Budgeting and Finance (4) Decision making; budget planning and formulation.
PAD 6053—Urban Administration (4) Organizational structure; recruitment; development of leadership; development of organization effectiveness.
PAD 6108—Public Administration Theory (4) Public administration, with emphasis on the units of analysis and contributions of each approach to general understanding of the field.
PAD 6109—Public Administrative Behavior (4) Major methodologies used in the approaches covered in PAD 6108.
PAD 6136—Contemporary Public Administration (3)
PAD 6327—Government and the Planning Process (4) Case studies of federal, regional, state, and local planning agencies. Planning as governmental process.
PAD 6946—Internship in Government (4) *Prereq: consent of department.*
POS 5247—Political Socialization (5)
POS 5425—Legislative Politics (5) *Prereq: POS 2041.* Advanced study in the legislative process. Recruitment of legislators. Formal and informal rules of behavior. Legislative-executive relations. The committee system. Impact of political parties, interest groups, and constituents on the legislative process.
POS 5685—Administration of Justice (5)
POS 5692—Social Effects of Law (5)
POS 5905—Individual Work (5)
POS 5933—Special Topics (5)
POS 6006—Social Structures and Political Power (4)
POS 6127—State Government and Politics (3) The bibliography, methodology, and research topics of American state and local governments.
POS 6157—Community Analysis (4) Development of social, economic, and political profiles in understanding the trends, projections, and public policy alternatives.
POS 6197—Federalism and Intergovernmental Relations (3) Exploration of theoretical bases and operation of American federal system.
POS 6207—Political Behavior (4) Consideration of participation, political culture, and public opinion including classic and current research.
POS 6407—Legislative-Executive Relations (4) Models and theories of legislative-executive interaction will be examined using extensive case materials.
POS 6617—Topics in Public Law (4) Judicial interpretation and enforcement of written constitutions. Separation of powers. The American federal system. Powers of the federal government. Due process and equal protection.
POS 6706—Contemporary Theories in Political Science (4)
POS 6736—The Conduct of Inquiry (4) Empirical research methodology in political science.
POS 6747—Topics in Political Methodology (4)
POS 6757—Survey Research (4) Methods of survey research in context of field investigation. Formulation of research hypotheses; construction of measuring instruments; collection, analysis of data.
POS 6905—Individual Work (1-5)
POS 6910—Supervised Research (1-5)
POS 6934—Special Topics (4)
POS 6940—Supervised Teaching (1-5)
POS 6946—Practicum in Applied Political Science (5)
POS 6971—Research for Master's Thesis (1-15)
POS 7980—Research for Doctoral Dissertation (1-15)
POT 6006—Values and Ideologies (4)
POT 6017—Leading Political Thinkers (4)
POT 6087—Latin American Political Thought and Ideology (3) *Prereq: reading knowledge of Spanish and undergraduate work in Latin American government.* Writings and theories of the leading Latin American political thinkers from Alberdi, Sarmiento, and Marti to contemporary figures.
POT 6207—American Political Thought (3)
POT 6506—Values and Administration (3)
POT 6617—Topics in Political Theory (4)
PUP 5105—Politics of Planning (5)
PUP 5405—Politics of Education (5)
PUP 6006—Policy Process (4) General examination of public policy formulation and implementation. Special emphasis upon political and economic determinants and relationship to social theory.
PUP 6007—Policy Evaluation (3) An examination of methodologies appropriate to the analysis of public policies.
PUP 6027—Linking Public Policies (3) An exploration of the linkages among various public policy areas.
PUP 6207—Environmental Policy (3) Examination of legal, institutional and political context of current environmental policy.
PUP 6317—Politics of Equality (3) An evaluation of public policies designed to further political and social equality in the United States.
PUP 6537—Public Policy of Housing (3)
PUP 6607—Health Politics and Policy (3) An examination of the American health care system from the public policy perspective.
PUP 6707—Political Economy (3) Comparison of politics and markets as authority structures and control systems.
PUP 6717—Regulatory Politics (3) An evaluation of normative theories, political structures and economic impacts associated with governmental regulatory procedures.

POULTRY SCIENCE
College of Agriculture

GRADUATE FACULTY 1979-80

Chairman: R. H. Harms. *Graduate Coordinator:* H. R. Wilson. *Professors:* J. L. Fry; R. H. Harms; H. R. Wilson. *Associate Professors:* B. L. Damron; C. R. Douglas. *Assistant Professors:* A. S. Arafa; D. M. Janky; R. D. Miles.

The Department of Poultry Science offers major work for the degrees of Master of Agriculture and Master of Science. Programs leading to the Doctor of Philosophy degree, with emphasis on problems related to poultry science, may be obtained through the Department of Animal Science, with staff members from the Department of Poultry Science directing the program.

Areas of specialization for both master's and Ph.D.

degrees are management, nutrition, physiology, and poultry products technology.

A departmental prerequisite for admission to graduate study is a sound background in the biological sciences.

The following courses in related areas are acceptable for graduate credit as part of the candidate's major: ANS 6636—Meat Technology; ANS 6288—Experimental Techniques and Analytical Procedures in Meat Research; ANS 6751—Physiology of Reproduction; ANS 6458—Advanced Methods in Nutrition Technology; ANS 6472—Vitamins; ANS 6723—Mineral Nutrition and Metabolism; ANS 6721—Nonruminant Metabolism; DAS 6531—Endocrinology; FOS 6226—Advanced Food Microbiology; FOS 6315—Food Chemistry; FOS 6428—Food Processing Systems; FOS 6726—Psychophysical Aspects of Foods; HUN 6245—Advanced Human Nutrition; VES 6242—Veterinary Physiology I; VES 6243—Veterinary Physiology II; DAS 6555—Environmental Physiology of Domestic Animals.

PSE 6227—Advanced Poultry Management (4) Poultry management presented on a seminar/short course basis utilizing lecturers currently working in areas under discussion. Field trips made to a variety of commercial operations.
PSE 6415—Advanced Poultry Nutrition (4) *Prereq: ASG 3404, PSE 4411.* Current topics in poultry nutrition; research techniques; formulation of experimental diets; linear programming procedures and practice.
PSE 6522—Avian Physiology (3-5) *Prereq: VES 3202.* Environmental physiology, ovulation cycle and egg formation, reproductive efficiency, experimental diets, physiological techniques.
PSE 6614—Advanced Poultry Products Technology (4) *Prereq: PSE 4611 or equivalent.* An intensive study of poultry products technology including chemical, physical, microbial, and organoleptic attributes of eggs and poultry meat.
PSE 6905—Problems in Poultry Science (1-4; max: 12) Individual problems in fields of nutrition, genetics, physiology, poultry and egg marketing and/or technology, and management.
PSE 6910—Supervised Research (1-5)
PSE 6931—Topics in Poultry Production (2-4; max: 9) *Prereq: ASG 3003, 3404.* Offered primarily to agricultural extension workers and vocational agriculture teachers, with one of the following topics specified: production principles, principles of handling and marketing, or nutrition.
PSE 6938—Graduate Seminar in Poultry Science (1; max: 3) Discussion of current literature and developments in poultry science.
PSE 6940—Supervised Teaching (1-5)
PSE 6971—Research for Master's Thesis (1-15)

PROFESSIONAL PHYSICAL EDUCATION
College of Physical Education, Health, and Recreation

GRADUATE FACULTY 1979-80

Chairman: O. J. Holyoak. *Graduate Coordinator:* R. E. Allen. *Professors:* R. Alexander; C. A. Boyd; O. J. Holyoak; N. M. Leavitt; H. A. Lerch; C. A. Moore; P. Varnes; C. W. Zauner. *Associate Professors:* R. E. Allen; D. A. Kaufmann. *Assistant Professors:* P. Boysen; R. A. Siders; P. D. Welch; N. S. Whiddon.

The Master of Arts in Physical Education (M.A.P.E.) degree program provides the student with an opportunity to study, conduct research, and prepare a thesis in an area of special interest. The Master of Physical Education (M.P.E.) degree program offers the student a beginning specialization in a selected area of study, with additional work in two other concomitant areas. A comprehensive written and oral examination is required for this degree.

The areas of emphasis offered in the M.A.P.E. and the M.P.E. are administration, coaching, curriculum and instruction, exercise physiology, human performance, kinesiology, motor learning, and research and evaluation.

Advanced degrees (specialists and doctorate) are offered through Curriculum and Instruction, College of Education, with a specialization in physical education in cooperation with the Department of Professional Physical Education.

HLP 6323—Evaluation Procedures in Health Education and Physical Education (4)
HLP 6345—Research Methods (4)
PET 5936—Current Topics in Physical Education (1-5) *Prereq: permission of department chairman.* Offered, upon request of students, to meet special interests inadequately covered in other courses.
PET 6015—Interpretations of Physical Education (3) Biological, psychological, sociological, and educational implications needed to interpret the function of physical education in contemporary democratic society.
PET 6145—Problems in Physical Education (4) *Prereq: HLP 6345.* Emphasis on research developments.
PET 6235C—Nature and Bases of Motor Performance (4) Principles relating to development of motor skill, with emphasis on conditions affecting its development and retention in physical education activities.
PET 6346C—Biomechanics of Human Motion (4) *Prereq: PET 3320; MGF 1113 or MAC 1132.* Application of principles of statics, kinematics, and kinetics to kinesiological systems of the human body in movement and sports skills.
PET 6365C—Physiological Bases of Physical Education (4) Application of fundamental concepts of human physiology to programs of physical education and sports. Recent research developments in sports physiology.
PET 6368L—Practicum in Exercise Physiology (3) *Prereq: PET 6365C.* Applied and experimental work emphasizing practical problems.
PET 6416—Problems in the Administration of Athletics (4) Intercollegiate and interscholastic athletic programs; relationships between athletics, education, and physical education; the administrator, control organizations; budget; equipment and facilities; intramurals; public relations; legal liability.
PET 6425—The Physical Education Curriculum (4) Principles and practices of developing an integrated physical education curriculum in grades K to 12.
PET 6445—The College Physical Education Program (4) Philosophy, program content, administration, and methods of conducting the required, intramural, and professional preparation programs of physical education in colleges and universities.
PET 6905—Directed Independent Study (1-5; max: 10) Individual research projects under faculty guidance.
PET 6910—Supervised Research (1-5)
PET 6925—Workshop Series in Physical Education (1-10) Special problems in physical education or health education.
PET 6932—Seminar in Physical Education (2-4) Research implications for the field of physical education.
PET 6940—Supervised Teaching (1-5)
PET 6971—Research for Master's Thesis (1-15)

PSYCHOLOGY
College of Liberal Arts and Sciences

GRADUATE FACULTY 1979-80

Chairman: M. E. Meyer. *Graduate Coordinator:* D. A. Dewsbury. *Graduate Research Professors:* Y. Brackbill; J. M. Enoch; W. B. Webb. *Professors:* B. Barger; G. G. Bechtel; W. W. Dawson; D. A. Dewsbury; F. R. Epting;

H. A. Grater, Jr.; J. M. Kolarik; T. Landsman; C. M. Levy, Jr.; N. N. Markel; M. E. Meyer; H. S. Pennypacker, Jr.; N. W. Perry, Jr.; P. Satz; P. G. Schauble; M. E. Shaw; D. C. Teas; R. I. Watson; R. C. Ziller. *Associate Professors:* W. K. Berg; M. N. Branch; W. R. Cunningham; I. S. Fischler; M. K. Goldstein; R. A. Griggs; E. E. Hall, Jr.; M. Holly; J. M. Johnston; E. F. Malagodi, Jr.; S. A. Miller; D. D. Nevill; B. R. Schlenker; L. J. Severy; D. I. Suchman; R. M. Swanson; C. J. Van Hartesveldt; C. J. Vierck, Jr.; D. W. Walker; S. F. Zornetzer. *Assistant Professors:* C. K. Adams; E. M. Altmaier; A. M. Bell-Nathaniel; W. J. Froming; P. J. Houlden; S. A. LaTour; C. Tucker; R. J. Waldbillig; K. D. White.

The Department of Psychology offers the Master of Arts and Master of Science and the Doctor of Philosophy degree. Students are not accepted for a terminal master's degree.

Doctoral areas of specialization include the teaching and research areas of cognition and perception, comparative, developmental, experimental analysis of behavior, psychobiology, social psychology, and personality counseling. The training program in counseling is approved by APA. A predoctoral internship of one year is required for the counseling psychology specialization.

Undergraduate preparation should include at least one course in experimental psychology and one course in statistics. Other courses in psychology should include at least three or four of the following: developmental, learning, perception, personality, physiological, and social. Applicants with GRE scores lower than 1200 are usually not admitted to graduate study in psychology.

CBH 5085—Seminar in Comparative Psychology (4) *Prereq: CBH 3003, STA 3023.* Intensive study of selected topics. Seminar format with emphasis on individual participation.

CBH 6056—Comparative Psychology (4; max: 12) *Prereq: PSB 6076 or consent of intructor.* A survey of literature in comparative psychology.

CBH 7088—Advanced Seminar in Comparative Psychology (3; max: 15) *Prereq: CBH 6056.* Restricted area of current importance.

CLP 6169—Seminar: Psychology of Deviant Behavior (4; max: 8) Analysis of specific deviant life styles, with emphasis on theory and research related to diagnosis and clinical management.

DEP 5049—Seminar: Contemporary Issues in Developmental Psychology (4) *Prereq: senior psychology major or consent of instructor and STA 3023.* Examination of recent developments and current issues in developmental psychology such as the role of early experience, psychological development of infants, behavior genetics, and sex role development.

DEP 6059—Seminar: Special Topics in Developmental Psychology (1-4; max: 16) Examination of theory and research in selected topics.

DEP 6099—Literature in Developmental Psychology (4) Empirical and theoretical foundations of developmental psychology.

DEP 6409—Seminar: Adult Development and Aging (4; max: 12) Topics in the psychology of aging, with emphasis on theory, research, and methodology.

DEP 6796—Measurement in Developmental Research (4) *Prereq: consent of instructor.* Familiarization with newborn, infant, preschool, and school age developmental testing procedures and instruments. Covers standardized tests and rating scales of intellectual, cognitive, motor, social, and emotional development.

DEP 6799—Seminar: Current Research Methods in Developmental Psychology (3; max: 15) *Prereq: DEP 6099.* Current research, theory, methodology, instrumentation, and instructional techniques.

DEP 6936—Special Topics in Developmental Psychology (1 to 2; repeatable to a maximum of 30 credits with change of content) In-depth exploration at graduate level of important issues and topics in the field.

DEP 7069—Seminar in Developmental Psychology: Cognitive Processes (4) Development of cognitive processes in relation to other psychological processes.

DEP 7118—Infancy and Early Childhood (4) Research findings in the development of psychological processes during the first five years of life, including prenatal, perinatal and postnatal influences on development.

DEP 7608—Theories of Child Development (4) Theoretical perspectives and major theorists in child and developmental psychology.

EAB 5055—Advanced Experimental Analysis of Behavior I (4) *Prereq: EAB 3002, STA 3023, and consent of instructor.* Advanced study of principles of behavior and analysis, contemporary theory, experimental findings, and research methods in operant behavior.

EAB 5436—Behavior Pharmacology (4) *Prereq: EAB 3002, STA 3023.* Experimental analysis of the mechanisms based on interactions of drugs with environmental variables controlling behavior.

EAB 5505—Motivation (4) *Prereq: EAB 3002, STA 3023 or consent of instructor.* Development of varying problems in the field of motivation as approached in the different areas of behavior analysis.

EAB 5935—Laboratory Methods in Psychology (4) *Prereq: upper level standing, one of EAB 3002, EXP 3604, PSB 3004, CBH 3003.* Basic instruction in the construction and programming of psychological laboratory apparatus. Includes coverage of mechanical, electromechanical, digital, and computer assisted apparatus.

EAB 6056—Research Tactics in Experimental Analysis of Behavior (4) *Prereq: EAB 3055, 6098.* Strategies, tactics, and methods of laboratory research in the experimental analysis of behavior.

EAB 6098—Literature in Experimental and Applied Behavioral Analysis (4) Empirical and theoretical foundations of various areas in experimental analysis of behavior.

EAB 6118—Theoretical Foundations of Behavior Analysis (4) *Prereq: EAB 5055 or 6098 and consent of instructor.* Examination of current theoretical issues in behavior analysis, with emphasis upon systematic integration of behavior principles into general behavior theory.

EAB 6707—Applied Behavior Analysis (4) Continuous, direct recording of human behavior. Tactics of behavior management. Research methods in applied behavior analysis.

EAB 6708—Literature in Applied Behavioral Analysis (4) *Prereq: EAB 5055 or 6098.* Introduction to literature in the analysis of behavior in applied setting with attention to political, personal, and historical dimensions of the area.

EAB 6719—Seminar: Strategies and Tactics of Human Behavioral Research (4) *Prereq: EAB 6707.* Advanced study of a scientific approach to investigating human behavior in applied settings.

EAB 6758—Measurement and Assessment of Behavior (4) Theory and practice of direct measurement of human behavior with application to clinical, social, and educational evaluation.

EAB 6937C—Seminar: Special Topics in Experimental Analysis of Behavior (1-5; max: 15) *Prereq: EAB 6098.* Current research, theory, and instructional techniques.

EAB 7089—Advanced Seminar: Experimental Analysis of Behavior (4) *Prereq: EAB 5055, 6098, and consent of instructor.* Restricted areas of experimental analysis of behavior such as schedules of reinforcement, stimulus control, current issues in research methods, and complex repertoires.

EAB 7729C—Advanced Seminar: Precise Behavioral Management (4) Clinical application of behavior analysis and innovative behavior change techniques; treatment in the natural environment and family setting is stressed.

EAB 7738—Seminar in Behavioral Medicine (4) *Prereq: six hours of human biology and consent of instructor.* Analysis of daily activities contributing to chronic disease states such as smoking, alcohol consumption, overeating, etc., is undertaken with review of relevant literature.

EAB 7739—Advanced Seminar in Behavioral Medicine (4) *Prereq: EAB 7738, six hours of human biology and consent of instructor.*

EAB 7799—Advanced Seminar: Applied Analysis of Behavior (4) Literature and methods in special applied settings and populations.

EAB 7888—Experimental Psychopathology (4) *Prereq: EAB 5055, 6098, and consent of instructor.* Normal and pathological effects of aversive control (punishment, avoidance, escape, complex contingencies, etc.).

EXP 5116—Vision (4) *Prereq: PSB 3004 or PCB 5745 or equivalent, with consent of instructor and STA 3023.* Visual process and supporting systems approached from the orientation of human vision.

EXP 6098—Literature in Cognition and Perception (4) Empirical and theoretical foundations of cognition and perception.

EXP 6108—A Survey of Sensory Systems (4) *Prereq: PCB 5745 or BMS 6510.* A group of specialists provide a survey of theories and experimental data on human and subhuman sensory reception and encoding. Auditory, visual, and cutaneous and chemical senses are included.

EXP 6109—Seminar in Sensory Processes (1) Topics of current interest in various areas of sensory specialties. S/U.

EXP 6119—Seminar on Vision (4) Current research and theory in visual function. Literature survey and design of an experiment relevant to recent theory.

EXP 6126C—Psychoacoustics I (5) *Prereq: SPA 3102.* Lectures, discussions and laboratory work on auditory stimulus, psychoacoustical methodology; general models of auditory processing.

EXP 6128—Psychophysiology of Hearing (5) Physiological representation of acoustic events within the auditory system. Anatomical information and analysis of electrophysiological literature.

EXP 6209—Seminar: Perception (4) Conditions, mechanisms, forms, and functions of perceptual processes.

EXP 6519—Seminar: Verbal Learning and Verbal Behavior (2-5; max: 15) *Prereq: EXP 4504, 6527, SPC 5905 or consent of instructor.* Consideration of various aspects of the process of acquiring and elaborating language and other verbal skills.

EXP 6527C—Retention and Forgetting (4) *Prereq: EXP 4504 and STA 3023.* Consideration of models of memory, paradigms utilized in the study of stimulus antecedents, organismic and response variables which influence retention and forgetting.

EXP 6609—Seminar: Cognition (2-5; max: 15) *Prereq: EXP 4604 or consent of instructor.* Selected topics in the areas of thinking, problem solving, and reasoning.

EXP 6717C—Psychophysics (4) *Prereq: EXP 3604, STA 3023 or consent of instructor.* Methods used to measure organisms' abilities and capabilities, including classical psychophysics, theory of signal detection, scaling, information theory, and modeling.

EXP 6939—Seminar: Current Issues in Cognition and Perception (2-4; repeatable to a maximum of 15 credits with change of content). *Prereq: consent of instructor.* Examination of selected major contemporary issues and data of current interest in the areas of cognition and perception.

EXP 7127C—Psychoacoustics II (5) *Prereq: SPA 5119 or EXP 6126.* Lectures, discussions, and laboratory work on advanced topics and current research in auditory sensation and perception.

EXP 7129—Seminar in Audition (3) Research problems in psychoacoustics, or acoustic physiology; recent advances in theories of hearing.

EXP 7689—Research Methods in Cognition and Perception (2; max: 16) *Prereq: consent of instructor.* Current research techniques and methods in the area of cognition and perception.

PCO 6059—Psychology of Counseling/Personality (4; repeatable with change of content to a maximum of 12 hours) *Prereq: graduate students in counseling psychology or permission of instructor.* Consider theory, practice and research in Counseling/Personality Psychology. Course is jointly offered by Counselor Education and Psychology.

PCO 6216—Personal Counseling (4) Current theories and practices in personal counseling; role of the counselor and nature of the counselor and nature of the counseling relationship.

PCO 6316C—Evaluation in Intelligence (4) *Prereq: consent of instructor.* Consideration of the fundamental theories of intelligence and intellectual assessment. Included will be practicum type administration.

PCO 6317C—Evaluation in Personality (4) *Prereq: Consent of instructor.* Consideration of the fundamental theories of personality and individual assessment of personality. Included will be practicum type administration of personality tests.

PCO 6939—Seminar: Current topics in Counseling Psychology (1-5; max: 15) *Prereq: PPE 6098, EGC 6416 or consent of instructor.* Selected topics in various aspects of counseling psychology. Emphasis on theoretical background and implications for applied work.

PCO 7217—Psychology of Individual Counseling (2) *Prereq: knowledge of counseling and personality theory. Coreq: enrollment in counseling practicum.* Interviewing skills, case management, supervision, professional issues/ethics, specialized intervention techniques.

PCO 7247—Group Counseling/Psychology (2) *Prereq: graduate student status. Coreq: must be enrolled in an appropriate practicum which includes experience in group counseling or therapy and graduate students in counseling psychology or permission of instructor.* This course considers the process of group counseling and psychotherapy as well as the counselor's role in facilitating the group process.

PCO 7537—Vocational Counseling Psychology (2) *Prereq: PCO 6059.* Introduction to counseling; examination of major theories and research in Vocational Counseling Psychology with special emphasis on vocational assessment.

PCO 7948—Practicum in Counseling Psychology (5; max: 25) *Prereq: written application to the counseling Psychology Practicum Coordinator.* Students perform counseling and consultation functions in university and community agencies under supervision of faculty and staff members. Open only to students in joint Psychology Department/Department of Counselor Education Program in Counseling Psychology.

PCO 7949—Internship in Counseling Psychology (5; max: 20) *Prereq: written application to the Counseling Psychology Internship Coordinator.* Full-time or equivalent work in a university or community agency where counseling functions are carried out under supervision. Open only to students in joint Psychology Department/Department of Counselor Education Program in Counseling Psychology.

PPE 6059—Seminar in Personality and Counseling Psychology (4; max: 12) *Prereq: PPE 4055 or 6098 or equivalent.* Personality development and dynamics.

PPE 6098—Literature in Personality (4) Empirical and theoretical foundations of various areas of the psychology of personality.

PPE 6209—Seminar on the Self (4) Developmental organization and change in selected dimensions of self are considered through the life span; methods of study, theory, and research.

PPE 6307—Research Methods in Personality and Counseling I (4) *Prereq: PPE 6098 or consent of instructor.* Theoretical, methodological, and procedural aspects of research in personality. Emphasis on issues related to measurement of personality variables.

PPE 6308—Research Methods in Personality and Counseling II (4) *Prereq: PPE 6098 or consent of instructor.* Theoretical, methodological, and procedural aspects of research in personality. Emphasis on issues frequently encountered in the design and analysis of experiments.

PPE 6327—Essentials of Psychological Testing (5) *Prereq: PPE 3004, STA 3023.* Coverage of all types of psychological tests and their usage in clinical, counseling, business, educational, governmental, military, and industrial applications. Test construction and the use of tests in psychological research.

PPE 6667—Psychology of Women (4) Theoretical and clinical aspects of female personality and psychobiology, including normal development and problems related to hormonal changes, menstruation, sexuality, pregnancy, motherhood, menopause, and gynecologic surgery. Focus on counseling women.

PPE 7288—Advanced Theories in Personality and Counseling Psychology (4; max: 12) Theoretical orientations in personality and research developments; particular groups of theorists examined.

PPE 7309—Advanced Research Seminar in Personality and Counseling Psychology (1-5; max: 20) Investigation of research areas involving literature and laboratory experimentation.

PPE 7947—Field Work in Personality Research (4) Field experience which allows students to involve themselves as personality psychologists in settings where human beings are undergoing change or crisis, or whose background differs from theirs.

PSB 5065—Biology of Human Behavior (4) *Prereq: STA 3023, PSB 3004.* Biological theories and models of mental retardation, schizophrenia, and affective disorders and others; treatments of these conditions.

PSB 5115C—Advanced Laboratory Topics in Physiological Psychology (4; max: 16) *Prereq: PSB 3004 or 6076 and consent of instructor.* Laboratory training in basic experimental techniques and procedures.

PSB 5325—Human Physiological Psychology: Psychophysiology (4) *Prereq: PSB 3004 or equivalent or consent of instructor.* Survey of research literature and procedures relevant to the study of physiological effects of events in humans. Topics to be discussed include brain waves, skin resistance, cardiovascular responses to arousal and stress, orienting and defense reactions, biofeedback, learning, and conditioning. Several laboratory sessions augment lectures and discussions.

PSB 5445—Drug Use and Abuse (4) *Prereq: 10 hours of psychology.* Objective, informational approach to the commonly used and abused drugs. Psychological, physiological, social, medical, legal, and historical aspects.

PSB 5465—Neurohumors and Behavior (4) *Prereq: STA 3023, PSB 3004.* Synthesis, action and metabolism of putative neural transmitters; pharmacological means of altering these; physiological or behavioral functions attributed to putative neural transmitters.

PSB 5505—Developmental Psychobiology (4) *Prereq: PSB 3004, STA 3023.* Basic principles of neural and behavioral development stressing the correlations among structural, chemical, endocrine, and behavioral events during maturation.

PSB 5935—Seminar in Physiological Psychology (3-5; max: 15) *Prereq: PSB 3004, STA 3023.* Selected topics on current research, methods, and theory.

PSB 6067—Human Brain Function (4) *Prereq: PSB 6076 or consent of instructor.* Recent advances in theory and experimental methods.

PSB 6076—Literature in Physiological and Comparative Psychology (4) Empirical and theoretical foundations of physiological and comparative psychology.

PSB 6086—Advanced Psychophysiology (4) *Prereq: PSB 5325 or consent of instructor.* Advanced literature and procedures in psychophysiology. Heavily oriented toward developing skills and knowledge of the laboratory tools. Students do an independent laboratory project.

PSB 6087—Advanced Physiological Psychology (4; max: 8) Current research and theory in physiological psychology, with emphasis on physiological bases of learning, memory, motivation, emotion, and reinforcement.

PSB 6607—Research Methods in Sensory Systems (4; max: 8) *Prereq: BMS 6512, EXP 6108.* Participation in laboratory experiments typical of several major areas of sensory systems. Laboratory experiences are provided in the facilities of several of the faculty participating in the program. These include visual, auditory, chemical and somesthetic, and pain sensory specialties. May be repeated for participation in extended experimental studies and/or learning of technical skills of specific sensory specialty.

PSB 6609—Seminar: Current Topics in Sensory Processes (1-5; max: 16) *Prereq: consent of instructor.* Readings in contemporary topics of interest.

PSB 6627—Cochlear Biophysics (5) Biophysics, anatomy and neurophysiology of the peripheral auditory system.

PSB 7069—Advanced Seminar in Higher Brain Funtion (4) Advanced seminar in research and theory with special emphasis on inter- and intrahemispheric processing.

PSB 7079—Seminar in Psychophysiology (1-4; max: 15) *Prereq: PSB 5325 or consent of instructor.* In-depth study of specialized topics.

PSB 7118—Current Research Methods in Physiological Psychology (4; max: 16) Advanced training in a new electrophysiological and neurochemical techniques used in studying the biological basis of behavior.

PSB 7248—Neurobehavioral Relations (4) Theories and data on the central nervous system basis for higher order function. Emphasis will be on arousal, purposeful behavior, and learning.

PSB 7249—Seminar in Neural Mechanisms and Behavior (4) *Prereq: PSB 6087.* Recent and specialized topics in brain-behavior relations.

PSB 7719—Seminar: Neural Mechanisms of Ingestion and Energy Regulation (2-4) Neuroanatomical, neurobehavioral, and neuroendocrinological mechanisms involved in the regulation of food and water consumption and regulation of body weight.

PSB 7817—Information Storage: A Neurobiological Approach (4) Consideration of data dealing with basic issues concerning the nature of behavioral plasticity and information storage and their central nervous system foundations. Particular emphasis is placed on memory disruption and facilitation as an experimental tool in the study of memory processes.

PSY 5605—History of Psychology (5) *Prereq: 20 quarter hours of psychology and STA 3023.* Survey of psychology from the time of the Greeks to the present, covering its background in philosophy, emergence as a modern, experimental science, and the contributions of movements such as structuralism, functionalism, behavioralism, and Gestalt psychology.

PSY 6268—Topics in Factor Analysis (4) *Prereq: EDF 6403, STA 6707 or consent of instructor.* Advanced topics in factor analysis, including direct factoring techniques, procrustes rotation to hypothesized target matrices, factor scores, and methods of establishing factorial invariance.

PSY 6328—Test Construction (4) Theory and practice in construction of tests of general aptitude, special aptitude, and personality traits. Psychophysical theory and techniques.

PSY 6508—Quantitative Modeling in Psychology (4) *Prereq: permission of the instructor.* Examination of the use of mathematical methods to investigate psychological problems.

PSY 6698—Contemporary Systems in Psychology (4) *Prereq: PSY 5605.* Differences in theoretical viewpoint which give rise to the emphasis responsible for the delineation of distinct systems in modern psychology. Original work of leading theorists and its impact on the science of psychology.

PSY 6905—Individual Work (1-5; max: 15) Reading or research areas in psychology.

PSY 6910—Supervised Research (1-5)

PSY 6939—Seminar: The Teaching of Psychology (1-5; max: 15) *Prereq: consent of instructor.* Examination and evaluation of contemporary approaches to teaching psychology. Laboratory and field experiences.

PSY 6940—Supervised Teaching (1-5)

PSY 6971—Research for Master's Thesis (1-15)

PSY 7980—Research for Doctoral Dissertation (1-15)

SOP 6069—Advanced Social Psychology I (4) *Prereq: SOP 3004, 4524 or equivalent.* Literature of social psychology, with emphasis on individual behavior.

SOP 6079—Advanced Social Psychology II (4) *Prereq: SOP 6069.* Literature of social psychology, with emphasis on interpersonal relations.

SOP 6099—Literature in Social Psychology (4) Empirical and theoretical foundations of social psychology.

SOP 6116—Theories in Social Psychology (4) *Prereq: SOP 4524, STA 3023.* Consideration of modern theories in social psychology in relation to experimental evidence.

SOP 6218C—Laboratory in Social Psychology I (4) *Prereq: SOP 6709.* Design and analysis of experiments pertaining to social phenomena, with emphasis on recent development in the field.

SOP 6219C—Laboratory in Social Psychology II (4) *Prereq: SOP 6229.*

SOP 6709—Seminar: Social Psychology (4; max: 16) *Prereq: SOP 6079.* Topics in social behavior, with emphasis on current theory and research.

SOP 7317—Research Methods in Social Psychology (4; max: 16) *Prereq: SOP 6239.* Experimental studies in social per-

ception, social influence, attitudes, leadership, interpersonal perception, and related social processes.
SOP 7318—Multidimensional Scaling for Market and Societal Analysis (5) *Prereq: STA 6167 or equivalent and fundamentals of matrix algebra.* Derivation of utilities from preferential choices; measurement of spatial attributes underlying utility; principal components and distance decompositions; scaling categorical judgments in survey research.
SOP 7319—Seminar: Research in Social Psychology (1-5; max: 20) *Prereq: Consent of instructor.* Consideration of theory, research design, analytical procedures and substantive findings in selected areas of social psychology, such as prosocial behavior, attitudes, personal space, impression management, attitude formation and change, leadership, small group behavior.
SOP 7339—Social Psychological Research in the Community (4) *Prereq: SOP 6709.* Consideration of problems and techniques of experimentation in natural settings.

REAL ESTATE AND URBAN ANALYSIS
College of Business Administration

GRADUATE FACULTY 1979-80

Chairman: A. Heggestad. *Graduate Coordinator:* H. C. Smith. *Professors:* A. Heggestad; H. C. Smith. *Associate Professors:* C. C. Curtis; L. A. Gaitanis. *Assistant Professor:* W. R. Archer.

The Department of Finance, Insurance, and Real Estate offers the nonthesis degree Master of Business Administration and the thesis degree Master of Arts in real estate and urban analysis, with the option of a certificate in urban studies. It also offers a major and minor in the Doctor of Philosophy degree in business administration.

For admission to courses listed below, the student must have had undergraduate courses in fields pertinent to the graduate courses selected; or, when equivalent educational background has been attained, special arrangements may be made with the approval of the graduate coordinator.

REE 6286—Seminar in Real Estate Financial Analysis (4) Mortgage risk analysis, mortgage risk rating; trading on equity; long- and short-term financing; problems encountered in slum clearance, subdivision, and urban redevelopment.
REE 6305—Seminar in Real Estate Valuation (4) Advanced theories and methods of appraisal. Statistical inference, market simulation, and application of specialized appraisal theory to appraisal problems.
REE 6395—Seminar in Real Estate Investment and Development (4) Case course illustrating advanced applications of real estate investment analysis to both existing properties and new development. Emphasis on problem identification, analysis, and prospective solutions.
REE 6609—Seminar in Land Use Controls (4) *Prereq: REE 4430 or consent of instructor.* Survey of environmental, planning, zoning, and similar laws with emphasis on Florida law. Costs and benefits as they relate to both private and public sectors.
REE 6756—Seminar in Land Use Analysis (4) Economic factors which provide the basis of urban economy and urban growth. Urbanization; regional planning; locations of cities and industries; private and public controls over urban land utilization and their impact upon the future of cities.
REE 6905—Individual Work in Real Estate (1-5; max: 10) *Prereq: permission of department and Director of Graduate Studies.* Reading and/or research in real estate.
REE 6910—Supervised Research (1-5)
REE 6936—Seminar in Housing Analysis (4) Decision problems in the housing industry, and methods of decision analysis applied within the prevailing legal, political, and technological context.
REE 6940—Supervised Teaching (1-5)
REE 6971—Research for Master's Thesis (1-15)
REE 7920—Real Estate Research Workshop (4; max: 8) Analysis of current research topics. Paper presentation and critiques by doctoral students, faculty, and visiting scholars.
REE 7980—Research for Doctoral Dissertation (1-15)

REHABILITATION COUNSELING
College of Health Related Professions

GRADUATE FACULTY 1979-80

Chairman & Graduate Coordinator: J. E. Muthard. *Professor:* J. E. Muthard. *Associate Professors:* J. G. Joiner; J. G. Saxon.

The Department of Rehabilitation Counseling offers the Master of Health Science degree, with special emphases in (a) generally disabled, (b) mentally ill, (c) mentally retarded, (d) criminally incarcerated, (e) severely disabled. The areas of special emphasis are primarily related to practicum work and internship. Special courses are taken for electives. Graduates are prepared for work in vocation rehabilitation agencies, mental health centers, prison systems, rehabilitation facilities, and other community, state, and federal settings. The program consists of five quarters, including a one-quarter internship in an agency setting. Practicum is required in each of the last three academic quarters. Practicum and internship sites vary depending upon the individual's interests and objectives.

In addition to the requirements of the Graduate School, acceptance in the program is dependent upon demonstrated interest and background in the helping professions, and demonstrated motivation.

EGC 5065—Introduction to Rehabilitation Counseling (5) Orientation to the rehabilitation process, including a survey of history, principles, philosophy, and legal aspects of rehabilitation and related fields.
EGC 5166—Psychological and Sociological Aspects of Rehabilitation (5) Social and personal problems of the handicapped; psychological aspects of physical and mental disabilities.
EGC 6374—Occupational Analysis and Placement Aspects of Rehabilation Counseling (5) Vocational structure of society, occupational skills, occupational entry requirements, and physical and emotional demands. Adaption and application of occupational information to rehabilitation counseling, including job analysis, placement, and follow-up techniques.
EGC 6375—Vocational Assessment Aspects of Rehabilitation Counseling (4) Systems and methods of vocational evaluation, administration, interpretation and application to the vocational rehabilitation process.
EGC 6376—Medical and Related Aspects of Rehabilitation Counseling (5) Medical implications for rehabilitation counselors, including anatomy, physiology, pathology of human systems; physical restoration and etiology, prognosis and therapy of the various disabling conditions.
EGC 6493—Rehabilitation Evaluation and Counseling with the Disabled (5) Application of evaluation, counseling theory and techniques to rehabilitation of disabled. Approaches in counseling the disabled; emphasis on techniques in practical situations, interviewing and specific testing procedures as vehicles of counseling. Limited classroom experience in counseling.
EGC 6675—Supervisory Techniques in Rehabilitation Counseling (4) Variable in organizational and community relationships, program planning, and supervisory functions related to the rehabilitation process.
EGC 6767—Research in Vocational Rehabilitation (4) Departmental research study in the vocational rehabilitation of the disabled.
EGC 6850—Rehabilitation Client Services Practicum (1-4; max: 12) Study of agency process and client services. Involvement in vocational evaluation, personal and social adjustment skills, and vocational and personal planning with clients.

EGC 6851—Rehabilitation Counseling Practicum (1-6; max: 12) Supervised individual counseling in a rehabilitation facility or agency. Intensive counseling regarding client's personal and adjustment problems. Emphasizes counselor-client relationship and the process and outcome of counseling procedure.
EGC 6885—Internship in Rehabilitation Counseling (10) *No student will be allowed to begin internship until 60 credits of degree requirement are completed and/or consent of the graduate faculty of the department is obtained.* Supervised field work in a recognized rehabilitation facility, including counseling case studies, contacts with community social agencies, and the vocational placement of disabled individuals. S/U.
EGC 6905—Individual Work (3-6; max: 6) Allows graduate students in rehabilitation counseling to pursue work not available in other courses.
EGC 6910—Supervised Research (1-5)
EGC 6940—Supervised Teaching (1-5)

RELIGION
College of Liberal Arts and Sciences

GRADUATE FACULTY 1979-80
Chairman & Graduate Coordinator: A. B. Creel. *Professors:* A. B. Creel; M. V. Gannon; R. H. Hiers; S. S. Hills, Jr.; D. L. Scudder *(Emeritus);* H. M. Stahmer. *Associate Professors:* S. R. Isenberg; B. Mesch; G. R. Thursby.

Graduate students may minor in the field of religion. For many years religion has been chosen as a minor by both master's and doctoral students working in such diverse departments as English, education, sociology, philosophy, and history.

Concentrations of strength exist in several areas, including the religions of India, religion in American culture, religion and society, and Jewish studies, with additional strength in biblical studies, philosophy of religion, and religious ethics.

While prerequisites are indicated for only a few of these courses, students with insufficient previous training in a given area in religion are urged to consult either the instructor or the graduate coordinator.

The *Undergraduate Catalog* should be consulted for a listing of courses in religion for which credit toward a minor may be given.

The faculty participates in the Ph.D. Program in the Humanities at Florida State University, which offers a concentration in religious studies. Additional information may be obtained at 115 Arts and Sciences Building or from the Director, Program in the Humanities, Florida State University, Tallahassee 32306.

ROMANCE LANGUAGES AND LITERATURES
College of Liberal Arts and Sciences

GRADUATE FACULTY 1979-80
Chairman: J. W. Conner. *Graduate Coordinators:* F. Ibarra *(Spanish);* R. Gay-Crosier *(French). Graduate Research Professor:* I. A. Schulman. *Distinguished Service Professor:* J. W. Conner. *Professors:* J. J. Allen; D. A. Bonneville; H. Der-Houssikian; R. Gay-Crosier; H. Hower; A. B. Smith. *Associate Professors:* S. R. Baker; B. Cailler; J. Casagrande; G. B. Coulson; G. T. Diller; F. Ibarra; M. M. Lasley. *Assistant Professor:* R. Garcia.

The department offers programs leading to the Ph.D. in Romance Languages and Literatures, with specialization in French or Spanish; the M.A. in French or Spanish (either with or without thesis); the M.A.T. in French or Spanish.

Candidates for the master's degree in French or Spanish have a choice of two options, one oriented toward literature, the other toward language. In conjunction with their master's or doctoral work, students specializing in Spanish may also earn a Certificate in Latin American Studies. Though a degree is not given in Portuguese, extensive course offerings permit students to develop a strong minor in Portuguese language and literature (particularly Brazilian).

Prerequisite for admission to graduate work is an undegraduate major in the language, including advanced courses in both literature and language. Candidates for the Ph.D. are required to take FOL 6732 and FRW 6805 or SPW 6806.

The foreign language requirement varies with degree and specialization; for details, consult the graduate coordinator. Every degree candidate is given the opportunity to gain teaching experience, either through a teaching assistantship or through participation in a departmental internship program.

FOL 6732—Introduction to Romance Linguistics (5) Comparative study of the major Romance languages and their development from Latin.
FOW 6930—Special Study in Romance Languages and Literatures (3-5; max: 15) Selected topic or problem (e.g., Medieval Romance lyric poetry) involving two or more Romance languages.

French
FRE 5423—Advanced French Composition (4)
FRE 5840—History of the French Language (4)
FRE 5851—The Structure of French (4)
FRE 6050—Beginning French for Graduate Students I (4) For students with no formal preparation who need a reading knowledge. S/U.
FRE 6051—Beginning French for Graduate Students II (4) *Prereq: FRE 6050 or the equivalent.* For students who need proficiency in reading. S/U option.
FRE 6464—Advanced Translation and Stylistics (4) *Prereq: FRE 5423.* Translation from English to French and French to English. Texts selected from modern authors. Various genres and styles.
FRE 6730—Special Study in French Linguistics (4)
FRE 6785—Advanced French Phonetics (4)
FRE 6940—Supervised Teaching (1-5)
FRW 5481—20th-Century French Literature (4)
FRW 5556—French Realism and Naturalism (4)
FRW 6215—French Prose of the Renaissance (4)
FRW 6217—17th-Century French Prose (4)
FRW 6276—The Novel of the 18th Century (4)
FRW 6288—Contemporary French Novel (4)
FRW 6311—17th-Century French Drama (4)
FRW 6318—French Classical Comedy (4)
FRW 6328—Contemporary French Theater (4)
FRW 6340—French Poetry of the Renaissance (4)
FRW 6351—Modern French Poetry (4)
FRW 6415—Old French Literature I (4)
FRW 6416—Old French Literature II (4)
FRW 6510—Baroque and Preclassicism (4)
FRW 6536—The Romantic Period (4)
FRW 6560—The French Symbolist Movement (4)
FRW 6711—The Philosophic Movement (4)
FRW 6755—20th-Century Caribbean and West African Literature of French Expression (4; max: 12)
FRW 6805—Introduction to Graduate Study and Research (4) Tools, problems, and methods of literary and linguistic research.
FRW 6825—Literary Criticism in France (4)
FRW 6900—Special Study in French Literature (4) Selected topic or problem (varied each quarter).
FRW 6905—Individual Work (2-5; max: 15) *Available only by special arrangement with graduate adviser.*

FRW 6910—Supervised Research (1-5)
FRW 6971—Research for Master's Thesis (1-5)
FRW 7980—Research for Doctoral Dissertation (1-5)

Portuguese
POW 6275—The 19th-Century Brazilian Novel (4)
POW 6276—The 20th-Century Brazilian Novel (4)
POW 6385—Brazilian Poetry (4)
POW 6386—Brazilian Drama (4)
POW 6400—Medieval and Renaissance Portuguese Literature (4)
POW 6930—Special Study in Brazilian or Portuguese Literature (3-5; max: 15) Selected topic or problem (varied each quarter).

Spanish
SPN 5315—Advanced Composition and Syntax (4)
SPN 5851—The Structure of Spanish (4)
SPN 6050—Beginning Spanish for Graduate Students I (4) For students with no formal preparation who need a reading knowledge. S/U.
SPN 6051—Beginning Spanish for Graduate Students II (4) *Prereq: SPN 6050 or the equivalent.* For students who need proficiency in reading. S/U option.
SPN 6730—Special Study in Spanish Linguistics (4)
SPN 6781—Advanced Spanish Phonetics (4)
SPN 6843—History of the Spanish Language (4)
SPN 6940—Supervised Teaching (1-5)
SPW 5135—Introduction to Spanish-American Literature I (4)
SPW 5136—Introduction to Spanish-American Literature II (4)
SPW 5137—Introduction to Spanish-American Literature III (4)
SPW 6216—Spanish Prose Fiction of the Golden Age (4)
SPW 6237—The Spanish-American Novel from Origins to Criollismo (4)
SPW 6245—The Picaresque Novel (4)
SPW 6269—Spanish Novel of the 19th Century (4)
SPW 6270—Contemporary Spanish Novel (4)
SPW 6285—Contemporary Spanish-American Novel I (4)
SPW 6286—Contemporary Spanish-American Novel II (4)
SPW 6313—Spanish Drama of the Golden Age (4)
SPW 6319—Spanish Drama of the 19th Century (4)
SPW 6325—Contemporary Spanish Theater (4)
SPW 6337—Spanish Poetry of the Golden Age (4)
SPW 6366—The Spanish-American Essay (4)
SPW 6400—Old Spanish Literature I (4)
SPW 6401—Old Spanish Literature II (4)
SPW 6481—Contemporary Spanish Literature (4)
SPW 6575—The Modernist Movement (4)
SPW 6602—Cervantes (4)
SPW 6705—Lope de Vega and His Contemporaries (4)
SPW 6729—The Generation of '98 (4)
SPW 6765—Argentine Literature (4)
SPW 6806—Introduction to Graduate Study and Research (4) Tools, problems, and methods of literary and linguistic research.
SPW 6902—Special Study in Spanish or Spanish-American Literature (4) Selected topic or problem (varied each quarter).
SPW 6905—Individual Work (2-5; max: 15) *Available only by special arrangement with graduate adviser.*
SPW 6910—Supervised Research (1-5)
SPW 6971—Research for Master's Thesis (1-15)
SPW 7980—Research for Doctoral Dissertation (1-15)

SOCIOLOGY
College of Liberal Arts and Sciences

GRADUATE FACULTY 1979-80

Chairman: B. L. Gorman. *Graduate Coordinator:* J. S. Vandiver. *Graduate Research Professor:* G. F. Streib. *Professors:* F. M. Berardo; B. L. Gorman; G. R. Leslie; G. A. Soares; C. R. Tittle;* J. S. Vandiver; G. J. Warheit. *Associate Professors:* E. W. Bock; C. E. Frazier; A. J. La Greca; T. L. McCoy; A. R. Rowe.* *Assistant Professors:* L. Beeghley III; L. Crandall; J. Henretta; P. Richards; I. C. Touhey;* H. O. Vera; C. Wood.

**These members of the faculty of Florida Atlantic University are also members of the graduate faculty of the University of Florida and participate in the doctoral degree program in the University of Florida Department of Sociology.*

The Department of Sociology offers the Master of Arts and the Doctor of Philosophy degrees with specialization in demography, Latin American area studies, social organization, social psychology, sociological theory and methods, and urban studies. The Master of Arts in Teaching degree is offered also.

Specific areas of specialization include the sociology of the family, deviance, social gerontology, medical sociology, and minorities.

Admission to the master's degree program requires at least 36 quarter credits of undergraduate study in the social sciences, including 18 quarter credits in sociology. Students planning to apply for admission should take the Graduate Record Examination at the earliest possible date.

Study for the Ph.D. degree in sociology at the University of Florida by qualified master's degree recipients at Florida Atlantic University is facilitated by a cooperative arrangement in which appropriate members of the faculty of FAU are members of the graduate faculty of the University of Florida.

DHE 6110—Seminar in Population (4)
DHE 6111—Seminar in Latin American Population (4) *Prereq: DHE 4101.*
DHE 6205—Population Policy (4)
DHE 6453—Seminar in Demographic Processes and Methods (4)
MAF 6405—The Sociology of Human Sexuality (4) *Prereq: SOC 2000.*
MAF 6507—The American Family (4)
MAF 6515—Comparative Family Systems (4)
MAF 6601—Seminar in Family Theories (4)
MAF 6611—Seminar in Family Research (4)
SOC 5905—Individual Work (1-5)
SOC 5933—Special Study in Sociology (4)
SOC 6050—Advanced General Sociology (4)
SOC 6115—Deviance (4)
SOC 6135—Juvenile Delinquency (4)
SOC 6155—Criminology (5)
SOC 6175—Research Problems in Deviance (4)
SOC 6235—Social Factors in Health and Illness (4)
SOC 6236—Comparative Studies in Health Systems (4)
SOC 6237—Health Facilities in The Modern Community (4)
SOC 6238—Health Professions in The Modern Community (4)
SOC 6244—Sociology of Death and Survivorship (4)
SOC 6246—Social Gerontology (4)
SOC 6247—Sociology of the Aged (4)
SOC 6312—Seminar in Urban Ecology (4)
SOC 6314—Seminar in Comparative Urbanization (4) *Prereq: SOC 3310.*
SOC 6315—Seminar in Metropolitan Growth and Development (4) *Prereq: 12 hours in social sciences.*
SOC 6321—Seminar: Sociology of Rural Development (4)
SOC 6335—Seminar in Brazilian Society (4)
SOC 6336—Seminar in Spanish-American Societies (4)
SOC 6337—Seminar in Contemporary African Societies (4)
SOC 6415—Social Inequality (4)
SOC 6426—Complex Organizations (4)
SOC 6435—Social Movements (4)
SOC 6466—Modernization in Latin America (4)
SOC 6501—Methods of Social Research (5)
SOC 6502—Social Research Methods (4)
SOC 6506—Survey Research (5) *Prereq: STA 3023.*
SOC 6616—Basic Sociological Theories (4)
SOC 6625—Comparative Sociology: Theory and Methods (4)
SOC 6630—Theory Construction (4)
SOC 6646—Development of Sociological Thought (4)
SOC 6647—The Development of Sociological Theories (4)

SOC 6748—Seminar in American Minority Groups (4)
SOC 6808—Seminar in Symbolic Interaction (4)
SOC 6827—Ethnomethodology (4)
SOC 6832—Personality and Social Structure (4)
SOC 6855—Collective Behavior (4)
SOC 6905—Individual Work (1-5) Designed to permit work on subjects not available in currently offered courses.
SOC 6910—Supervised Research (1-5)
SOC 6940—Supervised Teaching (1-5)
SOC 6971—Research for Master's Thesis (1-15)
SOC 7285—Research in Educational Sociology (5) *Prereq: EDF 6630, or any one of the following: EDF 6401, 6481, or STA 3013 and SOC 4500 or 6501, and specialization in sociology of education.*
SOC 7503—Seminar in Methods of Social Research (4; max: 12)
SOC 7657—Seminar in the Sociology of Knowledge (4)
SOC 7933—Special Study in Sociology (4; max: 12)
SOC 7935—Advanced Study in Sociology (5; max: 10) *Prereq: M.A. or equivalent degree in sociology.*
SOC 7980—Research for Doctoral Dissertation (1-15)

SOIL SCIENCE
College of Agriculture

GRADUATE FACULTY 1979-80

Chairman: C. F. Eno. *Graduate Coordinator:* B. G. Volk. *Professors:* W. G. Blue; H. L. Breland; R. E. Caldwell; D. V. Calvert; V. W. Carlisle; J. M. Davidson; C. F. Eno; J. G. A. Fiskell; L. C. Hammond; D. R. Hensel; C. C. Hortenstine; D. H. Hubbel; M. C. Lutrick; H. L. Popenoe; W. L. Pritchett; F. M. Rhoads; W. K. Robertson; D. F. Rothwell; W. H. Smith; D. O. Spinks; T. L. Yuan. *Associate Professors:* F. G. Calhoun; D. A. Graetz; R. W. Johnson; R. S. Mansell; P. G. Orth; B. G. Volk. *Assistant Professors:* V. E. Berkheiser; C. T. Hallmark; S. B. Sartain; J. J. Street.

The Department of Soil Science offers the Master of Science and the Doctor of Philosophy degrees with emphasis on soil chemistry, soil genesis and classification, soil microbiology, soil physics, or soil fertility. The nonthesis degree Master of Agriculture is also offered.

The interests of the student and the facilities available will determine the area of specialization for the research problem. Students will present a thesis or dissertation in their major field; however, Ph.D. candidates will be expected to qualify in all areas of soil science.

Prerequisites: Students who expect to do graduate work in the Department of Soil Science should present the bachelor's degree from a recognized college of agriculture with a major in soils or the equivalent in other sciences. Their background should include at least one course in each of the following: general soils, soil fertility, soil genesis and classification, general bacteriology, general botany, plant physiology, general field crops, general inorganic chemistry, qualitative analysis, and organic or biochemistry. Those not meeting the above requirements will be required to make up any deficiency early in their graduate work. Students will be held responsible for such basic undergraduate courses as are deemed necessary for the pursuit of their special program.

SOS 5132—Tropical Soils (3) *Prereq: SOS 3022, 4404.* Characteristics of tropical soils, emphasizing properties and processes in contrast to those of other areas.
SOS 6136—Soil Fertility (4) *Prereq: SOS 4404.* Plant response to variations in soil environment.
SOS 6233—Forest Soils (4) *Prereq: SOS 3022, FNR 3011 or equivalent.* Soil as a component of forest ecosystems. Soil chemical, physical, and biological properties influencing forest growth, biochemical and hydrological cycles as they relate to forest land use.
SOS 6323—Soil Microbiology (3) *Prereq: SOS 4303.* Microorganisms of mineral and organic soils; their ecological relationships and metabolic processes.
SOS 6325L—Soil Microbiology Laboratory (3) *Prereq: MCB 3013 and/or consent of instructor. Coreq: SOS 6323.* Laboratory experiments on soil-plant-microorganism relationships.
SOS 6414—Soil Chemistry (5) *Prereq: SOS 4404, CHM 3120C, CHM 3400.* Structural and chemical characteristics of soil reactive components and their relation to ion exchange, acidity, oxidation-reduction, and plant nutrient retention properties.
SOS 6418—Micronutrients in Soils (3) *Prereq: SOS 4414, BOT 3503.* Chemistry of micronutrients and micronutrient fertilizers in soils, with special reference to factors involved in their utilization by plants and animals.
SOS 6424—Laboratory Methods of Soil Chemical Analyses (4) *Prereq: SOS 4404, CHM 3120.* Instrumental and analytical procedures.
SOS 6444—Soil Organic Matter and Organic Soils (5) *Prereq: CHM 3200, 3200L, SOS 6136, 6323, 6414.* Chemistry of soil organic matter; techniques of identification; formation and management of organic soils.
SOS 6454—Colloidal and Physical Chemistry of Soils (5) *Prereq: CHM 3401, SOS 6414.* Theoretical treatment of ion exchange and activities of ions in solution and in suspension; energy relationships in soil colloids; aluminum chemistry; water properties; application of thermodynamics to the physiochemical aspects of soil colloids.
SOS 6464—Soil Mineralogy (5) *Prereq: GLY 6250, SOS 6414.* Composition and properties of soil minerals; techniques of identification and analysis of mixed mineralogical systems; relations of composite mineralogical characters to soil properties.
SOS 6622—Soil Physics (4) *Prereq: SOS 4602, MAC 3314, PHY 2040, 2041, 2042.* Basic physical concepts of the movement and retention of water, chemical solutes, heat, and air, with major emphasis upon water.
SOS 6717—Soil Genesis and Classification (4) *Prereq: SOS 4715.* Origin and application of the most recent USDA soil taxonomy. Includes diagnostic soil properties and soil characterization data.
SOS 6752—Morphology of Florida Soils (1) *Prereq or coreq: SOS 4718.* Field studies relating the influence of morphological characteristics on the suitability of Florida soils for agricultural and urban uses. Extensive trips required.
SOS 6905—Nonthesis Research (1-6; max: 9) *Prereq: 15 credits of soil science.* Study and research in a particular aspect of soils.
SOS 6910—Supervised Research (1-5)
SOS 6931—Seminar (1; max: 4) Presentation of literature, methods of proposed thesis research, and selected topics.
SOS 6932—Topics in Soils (4; max: 8) *Prereq: SOS 3022.* Variable content; offered by arrangement to qualified students at continuing education centers.
SOS 6940—Supervised Teaching (1-5)
SOS 6971—Research for Master's Thesis (1-15)
SOS 7980—Research for Doctoral Dissertation (1-15)

SPECIAL EDUCATION
College of Education

GRADUATE FACULTY 1979-80

Acting Chairman & Graduate Coordinator: J. E. Whorton. *Professors:* M. Cunningham (Emeritus) ; C. Forgnone; W. R. Reid; W. D. Wolking. *Associate Professors:* M. K. Dykes; C. D. Mercer; C. L. Reichard; J. E. Whorton. *Assistant Professors:* R. F. Algozzine; R. E. Schmid; S. E. Schwartz.

The department offers programs leading to the Master of Education or Master of Arts in Education degrees, the sixth year Specialist in Education degree, and the Doctor of Education or Doctor of Philosophy degrees.

Program specializations include the emotionally disturbed, the mentally retarded, specific learning disabilities, physically impaired/multiple handicapped, speech pathology and therapy, and administration of special education. For the latter, students should see courses listed in this *Catalog* under the Department of Educational Administration: EEX 6511—Administration of Special Education; EEX 7520—Seminar in Administration and Supervision of Special Education; EEX 7945—Practicum: Special Education Administration. In addition to area specializations, students may elect to emphasize handicapping conditions at developmental levels ranging from preschool through vocational levels.

EED 6221—Educational Aspects of Behavioral Problems in Children and Youth (3-5) *Prereq or coreq: EEX 3010, 6051.* An analysis of the emerging trends and procedures in providing services to children and youth who may be classified as having behavioral disorders. H.

EED 6225—Educational Theories and Practices for Children and Youth with Behavioral Problems (3-5) *Prereq: EED 4011 or 6221, EEX 3010 or 6051.* Current practices and operational rationales, administrative arrangements for present programs and evaluation of the teaching process. H.

EED 6241—Educational Programming for Children and Youth with Behavioral Problems (5) *Prereq: EED 4011 or 6221, EEX 3010 or 6051.* Structuring individualized remediation programs for children with behavioral disorders based upon psychoeducational evaluations. Curriculum materials and techniques to increase cognitive and affective dimensions of personal development. H.

EED 6245—Community Resources for Exceptional Children and Youth (2) *Prereq: EEX 3010 or 6051.* Community resources available to teachers of exceptional children and youth. Focus is on the organization, function, and operation of service agencies external to the school and the teacher's role as a facilitator of service delivery.

EED 6943—Practicum in Special Education: Behavioral Disorders (4-16; max: 16) *Prereq or coreq: EED 4011 or 6221 and written request prior to registration for permission to enroll.* Working with behaviorally disordered children and youth in a variety of settings.

EED 7930—Seminar: Program Development for Children with Behavioral Disorders (4) Latest innovations in special education media, models of information dissemination and their implications.

EED 7936—Seminar: Education of the Emotionally Disturbed Child (4) *Prereq: major in special education; admission to the Advanced School.* Special issues in the education of the emotionally disturbed child.

EEX 6045—The Exceptional Child in the Mainstream of Education (4) Principles and practices of special education as they relate to general education, including characteristics, identification, educational programming and placement, and due process.

EEX 6051—Teaching Exceptional Children (4) Care, treatment and education of children with problems and handicaps.

EEX 6059—Handicapped Students at the Secondary Level: An Overview (4) Historical aspects of programming review of current trends and literature; solving simulated and actual field problems; review of adult adjustment literature.

EEX 6065—Educational Programs for Handicapped Students at the Secondary Level (4) Curriculum materials and techniques appropriate for secondary programs for handicapped learners.

EEX 6521—Organization and Program Planning in Special Education (4) *Prereq: EEX 6051 and consent of instructor.* Control and management of special education programs, with emphasis on curriculum development based on needs assessment and evaluation.

EEX 6863—Supervised Practice in Special Education (16) *Prereq: approval of special education faculty in area of specialization and Office of Student Teaching.* Supervised teaching in selected school settings designed to serve children and and youth who have been classified as having behavioral and/or learning problems. Seminars and continuous evaluation of teaching experiences.

EEX 6883—Clinical Teaching: Basic Academic Skills (5) Individualized instruction of listening, speaking, writing, reading, spelling, and arithmetic skills. Materials, instructional sequences, and correction procedures for children with specific learning disabilities.

EEX 6905—Individual Work (2-5; max: 15) *Prereq: consent of department chairman, approval of the proposed project, and completion of at least nine hours of graduate work.*

EEX 6910—Supervised Research (1-5)

EEX 6932—Seminar: Single Case Experimental Research (4)

EEX 6940—Supervised Teaching (1-5)

EEX 6936—Special Topics (2-5; max: 15) *Prereq: consent of department chairman.*

EEX 7865—Internship: Special Education (3-16)

EEX 7930—Seminar in Special Education (4; max: 16) *Admission limited to special education majors in the Advanced School.* Consideration of current problems.

EEX 7934—Seminar: Trends in Special Education (4) *Admission limited to special education majors in the Advanced School.* Emphasis on trends in special education and future considerations for research, and local, state, and federal priorities.

EEX 7980—Research for Doctoral Dissertation (1-15)

EGI 6051—Education of the Gifted Child (4) Definitions of giftedness, characteristics of gifted children, and outside-of-school influences which affect achievement of gifted children.

EGI 6245—Program Development for the Gifted (4) School programs for the gifted. Educational provisions for the achieving and underachieving gifted individual.

ELD 6111—Direct Assessment of Handicapped Learners (3) Precision teaching, criterion referenced tests, task analysis, error analysis and classroom observations for continuous evaluation of methods, materials, and pupil progress. For initial assessments and individualized educational plans.

ELD 6112—Foundations in the Field of Specific Learning Disabilities (4) Definitions, history, contributors, theories, issues, instructional strategies, delivery systems, and trends in the field.

ELD 6211—Foundations of Clinical Teaching—Applied Behavior Analysis (4) Basic principles of operant and respondent behavior applied to the academic, social, and emotional problems of handicapped learners. Clinical instruction based on the dynamics of the behavioral ecology.

ELD 6213—Behavior Analysis Applied to Developmental Deficits (4) Direct training procedures for accelerating the development of basic perceptual-motor, language, social, and self-control skills in children with severe and moderate developmental deficits.

ELD 6241—Program Designs for Children with Specific Learning Disabilities (4) Programs for delivering educational services: their structure, content, administrative features, and educational advantages.

ELD 6936—Seminar: Current Literature in Specific Learning Disabilities (1-2; max: 9) Reading and discussion of current literature in the field.

ELD 6937—Seminar: Early Identification and Remediation of Specific Learning Disabilities (4) Recent literature on early identification and remediation; procedures for starting early intervention programs.

ELD 6944—Practicum in Special Education: Specific Learning Disabilities (4-16) *Written request is required six weeks prior to registration.* Includes supervised field experiences with children with specific learning disabilities. Supervision consists of direct observation, group sessions, individual consultation, and quantified feedback on teaching effectiveness.

ELD 6947—Laboratory: Evaluation in Special Education (3-6; max: 6) *Open only to majors in special education. Prereq: EEX 6051.* Tests and other instruments used in evaluating pupils with learning disabilities.

ELD 7938—Seminar: Advanced Topics in Learning Disorders (4-12; max: 12) *Prereq: ELD 6112.* Review of selected literature and formulation of research problems in the area of learning disorders and instruction.

EMR 6361—Education of the Mentally Retarded (4) *Prereq:*

consent of instructor. School programs for the retarded. Educational provisions for the retarded affected by environmental deprivation and sensory and other impairment.

EMR 6801—Practicum in Special Education: Mental Retardation (4-12; max: 12) *Prereq: EMR 3050 and written request six weeks prior to registration.* Tutoring mentally retarded children in educational situations appropriate to the student's professional goals.

EMR 7936—Seminar: Mental Retardation (4) *Prereq: EMR 6361.* Theoretical implications of mental retardation for intelligence, environment, and behavior.

EPH 6185—Laboratory in Special Education Assessments of Severely Handicapped Children (3-5) *Open only to advanced students in special education. Prereq: EEX 6051, ELD 6947; EED 6241, ELD 6112, or 6936.* Assessment techniques, evaluation programs, and prescriptive work.

EPH 6305—Educational Management of the Physically Impaired/Multiple Handicapped (3-5) *Prereq or coreq: EEX 6051, EPH 6395, 6185, 6942.* Programming and evaluation for young children with physical impairments/multiple handicaps, including curriculum, materials.

EPH 6395—Physiological Aspects of Physical/Multiple Handicaps (2-5) *Prereq or coreq: EEX 6051.* Educational implications and programming modifications required by physical/multiple handicaps. Relationship between educational programming and pathologies of central nervous system—motor sensory, language, and psychological disorders. H.

EPH 6411—Education of Severely Handicapped Children (2-5) *Prereq: EEX 6051 or equivalent and consent of instructor.* Educational procedures and modifications required for children and youth with physical impairments including sensory, neurological, skeletal, and muscular problems. H.

EPH 6942—Practicum in Special Education: Physically Impaired/Multiple Handicapped (4-12; max: 12) *Prereq or coreq: EEX 6051, EPH 6411, and written request six weeks prior to registration.* Evaluation and programming for children in PI/MH programs in various settings.

EPH 7936—Seminar: Education of the Severely Physically Impaired/Multiple Handicapped Child in Institutions (2-4) Evaluation of the latest innovations in programs.

EPH 7937—Seminar: Education of Physically Impaired/Multiple Handicapped Children in Public Schools (2-4) Evaluation of current research on the education of children in public schools for the PI/MH.

SPEECH
College of Liberal Arts and Sciences

GRADUATE FACULTY 1979-80

Chairman: T. B. Abbott. *Graduate Coordinator:* T. J. Saine, III. *Distinguished Service Professor:* G. P. Moore. *Professors:* T. B. Abbott; K. R. Bzoch; D. Dew; L. C. Hammer; H. F. Hollien; P. J. Jensen; N. N. Markel; R. Scholes; D. C. Teas; R. E. Tew; D. E. Williams. *Associate Professors:* W. S. Brown, Jr.; A. J. Clark; M. P. Nattress; A. Paige; H. B. Rothman; T. J. Saine III; P. Schmidt. *Assistant Professors:* D. L. Brown; W. H. Cutler; K. J. Gerhardt; J. Kemker; L. L. LaPointe; L. J. Lombardino; E. Scroggie, Jr.; W. N. Williams.

Graduate programs in the Department of Speech lead to Master of Arts, Master of Arts in Teaching, and Doctor of Philosophy degrees. Students, in conjunction with their supervisory committees, develop graduate programs to meet their specific needs and interests. Major areas of emphasis include audiology, communication sciences, communication studies, speech pathology, and language behavior.

Assistantships, fellowships, non-Florida tuition waivers, and traineeships are available.

COM 6121—Seminar: Organizational Speech Communication (4) *Prereq: COM 4110 or equivalent.* Analysis of speech communication variables as they operate in volunteer, commercial, governmental, and service organizations.

COM 6300—Introduction to Graduate Study (4) *Required of all graduate students majoring in speech.*

COM 6316—Quantitive Research in Speech I: Applied Methodologies (4) Analysis and design of quantitative studies, with emphasis on identifying and predicting behavioral antecedents or orally transmitted messages.

COM 6318—Measurement in Speech Communication (4) *Prereq: STA 6166.* Operationalizing of speech communication variables; methods of empirical evaluation for the teacher of speech communication.

COM 6320—Quantitative Research in Speech II: Laboratory Methodologies (4) Emphasis on design and analysis of speech experiments in the laboratory setting.

COM 6350—Methods of Theory Construction in Speech (4) Philosophical questions of theory construction with special emphasis associated with analysis and systematic construction of hypothetico-deductive theory.

LIN 5223—Distinctive Features: Theory and Application (4) *Prereq: a basic course in phonetics or consent of instructor.* Empirical and theoretical foundations of distinctive features. Applications of distinctive feature analysis to current problems in speech pathology and phonetic science.

LIN 5715—Language Acquisition (4) *Prereq: Undergraduate course in language development or consent of instructor.* Comprehensive consideration of the stages and processes of language acquisition from birth to adulthood. Observation, analysis, and reporting of actual children at various stages of language acquisition are required.

LIN 6705—Psycholinguistics (5) Research literature. Evaluation of theories, historical factors, geographic distinctions, and research procedures related to language development and usage.

LIN 6705L—Psycholinguistics Laboratory (3) *Prereq: LIN 6705.* Design and analysis of experiments pertaining to the psychology of language. Areas of current research interest.

LIN 6707—Neurobehavioral Linguistics (5) *Prereq: SPA 5135, LIN 5231.* Nature and use of experimental method in linguistics. Evaluation of selected research topics.

LIN 6716—Child Language (3) Advanced psycholinguistic study of early stages of syntax acquisition.

LIN 7195—Seminar in Experimental Linguistics (3) Selected problems in linguistic theory and research, with emphasis on experimental analysis.

LIN 7295—Seminar in Experimental Phonetics (3) Advanced research problems in production of voice or speech.

LIN 7709—Seminar in Psycholinguistics (3) Theoretical and research problems in psycholinguistic processes of communication.

SED 5340—Teaching Speech in Higher Education (4) Problems, methods, and materials in the teaching of speech in colleges or junior colleges. Courses of study, textbooks, and teaching strategies.

SED 5372—The Modern Forensics Program (4) *Prereq: experience as participant or director of forensic activities.* Methods and philosophies of administering forensics programs at the high school and college level.

SED 6930—Seminar: Instructional Development in Speech (4) *Prereq: SED 5340* History, theory, and research in the teaching of speech at all levels.

SPA 5105—Neurophysiology of Hearing (3-5) *Prereq: SPA 3102 and SPA 5111.* Neuroanatomy of the auditory system, peripheral and central dynamics of the cochlea, electrophysiological response in the cochlea and in various levels of the auditory system. Although this course bears the same title as SPA 3105, graduate students will be expected to pursue the topic in greater depth. May be repeated once.

SPA 5111—Theoretical Foundations in Audiology (4) *Prereq: SPA 5304.* Concepts and principles relevant to audiometric evaluation and methods used in developing audiological procedures.

SPA 5119—Psychoacoustics I (5) *Prereq: SPA 3102.* Lectures, discussions, and laboratory work on auditory stimulus, psychoacoustical methodology; general models of auditory processing. Although this course bears the same title as SPA 4118, graduate students will be expected to pursue the topic in greater depth.

SPA 5122—Auditory Perception of Speech (4) *Prereq: SPA 3102 and consent of instructor.* In-depth study of the concepts and principles of speech, with emphasis on the

auditory system; psychophysical methods, test materials, and basic subjective correlates of speech perception.

SPA 5135—Electro-Acoustical Laboratory (3) *Prereq: EEL 3368L.* Advanced analysis and description of electro-acoustical instruments employed in speech, hearing and language research.

SPA 5202—Principles of Speech Pathology: Articulation-Phonological Disorders (4) Advanced principles of diagnosis and therapy for individuals with articulatory disorders.

SPA 5211—Principles of Speech Pathology Voice Disorders (4) Advanced theory and techniques of diagnosis and therapy for voice disorders.

SPA 5223—Principles of Speech Pathology: Stuttering (4) Advanced theories and techniques of diagnosis and therapy for stuttering.

SPA 5242—Communicative Disorders Related to Cleft Palate (4) *Prereq: SPA 5202, 5211, 5403.* Lectures, discussions and laboratory study of the "team approach" and interdisciplinary aspects of correcting communicative disorders in the cleft palate individual.

SPA 5304—Principles of Audiological Evaluation (4) Advanced procedures in speech audiometry, masking, and audiogram interpretation.

SPA 5322—Auditory Training and Speechreading (4) *Prereq: SPA 5423 or consent of instructor.* Advanced methods in aural rehabilitation procedures.

SPA 5403—Principles of Speech Pathology: Language Disorders I (3) Advanced theory and techniques of diagnosis of language disorders.

SPA 5404—Principles of Speech Pathology: Language Disorders II (Intervention) (3) Advanced procedures in the treatment of language disorders.

SPA 5423—Speech and Language for the Deaf and Hard-of-Hearing (4) *Prereq: SPA 5304 or consent of instructor.* Advanced principles and procedures in the development and correction of speech and language of the deaf and hard-of-hearing.

SPA 5553—Principles of Speech Pathology and Audiology: Diagnosis and Appraisal (2) Advanced analysis of interviewing principles, examination procedures, standardized testing and clinical assessment techniques.

SPA 6107—Cochlear Biophysics (5) The biophysics, anatomy and neurophysiology of the peripheral auditory system.

SPA 6120—Psychoacoustics II (5) *Prereq: SPA 5119.* Lectures, discussion, and laboratory work on advanced topics and current research in auditory sensation and perception.

SPA 6125—Psychophysiology of Hearing (5) Physiological representation of acoustic events within the auditory system. Anatomical information and analysis of electrophysiological literature.

SPA 6140—Experimental Phonetics: Laryngeal Function (3) Principles involved in acoustical and physiological analyses of voice production and laryngeal function. Major theories, experimental procedures, and research findings.

SPA 6141—Experimental Phonetics Lab I (3) *Prereq: SPA 6140.* Laboratory experience in experimental methods and techniques for study of voice production and analysis of voice signals. Students required to design and carry out an experiment in this area.

SPA 6145—Experimental Phonetics II (3) *Prereq: SPA 5135.* Principles of scientific analysis of speech production and recognition; major theories, experimental procedures, and research findings.

SPA 6146—Experimental Phonetics: Special Topics (3-9; max: 9). Laboratory experience in major experimental methodologies and techniques in speech articulation, resonation, and function. Each student required to design and carry out a pilot study in this area.

SPA 6155—Proseminar in Communication Sciences (3) *Required of all beginning students in any communication sciences area.* Scientific and theoretical basis of communication sciences. Experimental phonetics, audition, psycholinguistics, experimental linguistics, and communicative factors engineering.

SPA 6204—Seminar in Speech Pathology: Articulation Disorders (2) *Prereq: SPA 5202.*

SPA 6206—Seminar in Speech Pathology: Myofunctional Disorders (2)

SPA 6207—Seminar in Speech Pathology: Neurogenic Articulation Disorders (2) *Prereq: SPA 5202.*

SPA 6214—Seminar in Speech Pathology: Alaryngeal Speech (2) *Prereq: SPA 5211.*

SPA 6215—Seminar in Speech Pathology: Voice Disorders (2) *Prereq: SPA 5211.*

SPA 6216—Seminar in Speech Pathology: Special Voice Problems (2) *Prereq: SPA 5211.*

SPA 6226—Seminar in Speech Pathology: Stuttering in Adults (2) *Prereq: SPA 5233.*

SPA 6227—Seminar in Speech Pathology: Stuttering in Children (2)

SPA 6231—Seminar in Speech, Hearing and Language: Cerebral Palsy (2)

SPA 6245—Seminar in Speech, Hearing, and Language: Cleft Palate (2)

SPA 6305—Seminar in Audiology: Audiology for Children (2) *Prereq: SPA 6313.*

SPA 6313—Seminar in Audiology: Diagnostic Procedures for Peripheral Disorders (4) *Prereq: SPA 5304.*

SPA 6314—Seminar in Audiology: Diagnostic Procedures for Central Hearing Disorders (2)

SPA 6318—Seminar in Audiology: Diagnostic Procedures for Special Problems in Hearing (2) Theoretical and experimental literature and procedures for differential diagnosis of nonorganic hearing disorders and other special problems.

SPA 6327—Seminar in Audiology: Aural Rehabilitation (2)

SPA 6345—Seminar in Audiology: Hearing Aids (4) *Prereq: SPA 6313.*

SPA 6364—Seminar in Audiology: Psychology of Deafness (2)

SPA 6407—Seminar in Speech Pathology: Language Disorders (2) *Prereq: SPA 5403*

SPA 6410—Seminar in Speech, Hearing and Language: Aphasia (3)

SPA 6411—Seminar in Language Pathology: Childhood Aphasia and Autism (2) *Prereq: SPA 5403.*

SPA 6435—Seminar in Speech, Hearing, and Language: Mental Retardation (2)

SPA 6445—Seminar in Language Pathology: Parent-Child Interaction and Language Interaction (2) *Prereq: SPA 5403.*

SPA 6521—Clinical Practice in Speech Pathology: Diagnosis (1-10; max: 10) *Prereq: SPA 5553. S/U.*

SPA 6524—Clinical Practice in Speech Pathology: Therapy (1-15; max: 15) Supervised clinical practice in speech therapy. S/U.

SPA 6531—Clinical Practice in Hearing Measurement (1-10; max: 10). Supervised clinical practice in hearing measurement. S/U.

SPA 6533—Clinical Practice in Aural Rehabilitation (1-10; max: 10) *Prereq: SPA 5423, 5322.* Supervised clinical practice in aural rehabilitation S/U.

SPA 6600—Organization and Administration of Speech Pathology and Audiology Programs (4) Administrative problems and practices in varied speech pathology and audiology settings, community clinics, hospitals, schools, universities, training centers, and private practice.

SPA 6710—Seminar in Intercultural Communication (4) Analysis and evaluation of research trends. Re: personal communicaton in crosscultural contexts.

SPA 6855—Seminar in Speech Pathology and Audiology: Counseling (2) Study of procedures for interpretation of clinical findings and recommendations in speech pathology and audiology to client and family and approaches for assistance in coping with the ramifications of speech, language, and hearing problems.

SPA 6933—Special Topics in Communication Sciences (1; max: 10) Discussion of current topics in fields of graduate study and research. S/U.

SPA 6940—Supervised Teaching (1-5)

SPA 7127—Seminar in Speech Recognition (3) Advanced research problems in analysis and synthesis of speech. Emphasizes vocoders, machine translation, and computer processing of speech.

SPA 7128—Seminar in Audition (3) Research problems in psychoacoustics, or acoustic physiology; recent advances in theories of hearing.

SPA 7354—Seminar in Audiology: Hearing Conservation and Noise Control (2)

SPA 7523—Practicum in Speech Pathology in a Medical-Dental Setting (3-10; max: 12) *Prereq: SPA 6521, 6524* consent of department. Supervised training in clinical management of oral communication problems in a medical-dental setting. Each succeeding registration requires increasing levels of competence and responsibility. S/U.
SPA 7536—Practicum in Audiology in a Medical Setting (1-10; max: 12) *Prereq: SPA 6531* consent of department. Supervised training in clinical management of auditory communication problems in a medical setting. Each succeeding registration requires increasing levels of competence and responsibility. S/U.
SPC 5148—Man-Machine Communication (4) *Prereq: COC 3110, COP 3212, EIN 3114.* Interactive communication technology, natural language related research.
SPC 5149—Applications of Digital Computers to Speech Research (3) *Prereq: EIN 3114* and *SPA 5135.* Computational applications of digital computers to speech research: elaboration of FORTRAN, use of analog-to-digital converters, and use of small laboratory computers.
SPC 5335—Nonverbal Communication (5) Advanced theories and methods in the experimental study of nonverbal communication.
SPC 5610—Persuasion in Social Movements (4; max: 12) Critical examination of public speaking in major controversies related to political, social, and intellectual life in America.
SPC 5631—Theories of Political Communication (4) *Prereq:* advanced work in contemporary history, public address, or political science. Same as *SPC 4631.* Examination of theories of political communication. Field work investigations and assessment of individual theories.
SPC 5905—Special Topics (3-5; max: 10) *Prereq:* consent of major professor and department chairman. Completion of a graduate project or research in a specific area of speech.
SPC 6218—Seminar: Human Communication Theory (4; max: 12) Major ways of conceptualizing the role of communication in human affairs; process of building a human communications theory.
SPC 6239—Studies in Rhetorical Communication (4; max: 12) Selected topics including examination of ancient, medieval, renaissance and modern writers who have influenced rhetorical thought, criticism, speaking, and writing.
SPC 6253—Principles and Theories of General Semantics (4) Systematic investigation of concepts and methodologies related to a broad theory of communication evaluation based on modern scientific knowledge and postulates.
SPC 6493—Theories of Small Group Communication (4) *Prereq: SPC 3440* and *3210* or consent of instructor. Representative theories of the communication behavior of individuals in small, face-to-face, problem-solving groups, including current research on the content, frequency, duration and direction of communication in discussion groups.
SPC 6545—Studies in the Processes of Influence (4) Examination of how communication can be used to gain influence and compliance.
SPC 6619—Seminar in American Public Address (4) Selected speeches, speakers, and speaking movements which have had an impact on our history.
SPC 6682—Rhetorical Criticism (4) Principles and methods of rhetorical criticism; problems in applying critical standards in the evaluation of public address.
SPC 6905—Individual Study (1-10; max: 10) *Prereq:* consent of major professor and department chairman. Project or research course.
SPC 6910—Supervised Research (1-5)
SPC 6971—Research for Master's Thesis
SPC 7190—Seminar in Communication Sciences (3) Advanced research problems.
SPC 7493—Seminar in Group Communication (4) *Prereq: SPC 6442.* Advanced research problems in the study of face-to-face group communication. Emphasizes content analysis, speech patterns, and temporal aspects of verbal communication.
SPC 7548—Seminar: Theories of Persuasion (4) *Prereq: SPC 6545* or consent of instructor.
SPC 7937—Seminar in the Philosophy of Speech Communication (4; max: 12) Open to advanced graduate students in rhetoric and public address. Problems, research, and current literature in theory, criticism, pedagogy, or quantitative exploration in the area of speech communication.
SPC 7980—Research for Doctoral Dissertation (1-15)

STATISTICS
College of Liberal Arts and Sciences

GRADUATE FACULTY 1979-80

Chairman: R. L. Scheaffer. *Graduate Coordinator:* J. G. Saw. *Professors:* J. A. Cornell; W. Mendenhall; Z. R. Pop-Stojanovic; P. V. Rao; J. G. Saw; R. L. Scheaffer. *Associate Professors:* A. G. Agresti; V. Chew; R. C. Littell; F. G. Martin; J. T. McClave; J. J. Shuster; D. D. Wackerly; M. C. K. Yang. *Assistant Professors:* J. M. Boyett; A. I. Khuri; R. Marks.

Graduate programs are available leading to Master of Science in Statistics, Master of Statistics, and Doctor of Philosophy degrees. Both master's programs usually require two years of course work including material covered in STA 6206, 6207, 6208, 6326, 6327, 6328, 6246, 6247.

STA 5106—Computer Programs in Statistical Analysis I (2) *Prereq:* concurrent registration in *STA 4203, 6167,* or *6207,* or consent of instructor. Instructions for utilizing library programs with statistical interpretation of terms and parameters.
STA 5107—Computer Programs in Statistical Analysis II (3) *Prereq: STA 5106* and concurrent registration in *STA 4204, 6167,* or *6208,* or consent of instructor. Computer programs in advanced statistical analyses, including multiway classifications with unbalanced data, nonlinear regression, probit analysis, stepwise regression, multidimensional contingency tables, and cluster analysis.
STA 6126—Statistical Methods in Social Research I (4) Descriptive statistics, estimation, tests of hypotheses, chi-square test of independence, measures of association for nominal and ordinal variables, regression and correlation, introduction to multiple regression.
STA 6127—Statistical Methods in Social Research II (4) Continuation of multiple regression and correlation procedures, model building, analysis of variance, nonparametric procedures for comparing groups, analysis of covariance.
STA 6166—Statistical Methods in Research I (4) Estimation, tests of hypotheses, basic experimental designs, least squares, regression and correlation. Some nonparametric techniques. Applications in the physical and biological sciences and in business.
STA 6167—Statistical Methods in Research II (4) *Prereq: STA 6166.* Analysis of variance for basic experimental designs. The factorial experiment. Applications in business and in the physical and biological sciences.
STA 6168—Advanced Methods of Statistics (3) *Prereq: STA 6167.* Complex experimental designs, including incomplete blocks, confounding, fractional replication, and response surfaces.
STA 6176—Biostatistics I (4) *Prereq: STA 6167* or *6208.* Statistical methods in biological assay; direct assays; indirect assays; dose-response relationships; nonlinear regression; parallel line assays; potency estimation.
STA 6177—Biostatistics II (4) *Prereq: STA 6176.* Inferences from hospital data; nonparametric methods in medical research, including distribution free multiple comparisons, rank analysis of covariance, indices of order association; nonparametric partial correlation; multidimensional contingency tables.
STA 6178—Biostatistics III (4) *Prereq: STA 6177.* Multivariate problems in biostatistics; repeated measurements; discriminant analysis; diagnostic models; factor analysis; current topics in biostatistics.
STA 6206—Design and Analysis of Experiments I (4) *Prereq: STA 4322.* Basic concepts in design of experiments. Principles of statistical inference for linear models. Method of least squares, analysis of variance, multiple comparison procedures.
STA 6207—Design and Analysis of Experiments II (4) *Prereq:*

STA 6206. Factorial experiments, incomplete blocks, nested experiments, split plots, covariance.

STA 6208—Design and Analysis of Experiments III (4) *Prereq: STA 6207.* Design aspects of incomplete blocks, confounding, fractional factorials.

STA 6226—Sampling Theory and Application I (4) *Prereq: STA 6327 or consent of instructor.* Theory of basic sampling procedures in economic and social surveys. Multistage sampling, cost functions, double sampling.

STA 6227—Sampling Theory and Application II (4) *Prereq: STA 6226.* Stochastic processes as applied to sampling theory and other current research topics in sampling.

STA 6246—Theory of Least Squares (4) *Prereq: STA 6327.* Application of the Markov theory of least squares to problems of estimation and tests of hypotheses; distribution theory under normal assumptions.

STA 6247—Advanced Topics in Design and Analysis (4) *Prereq: STA 6208.* Random and mixed models, response surface methodology, mixture experiments, additional topics in regression.

STA 6267—Sequential Methods (4) *Prereq: STA 6328.* Double sampling procedures, the sequential probability ratio tests, sequential tests for composite hypotheses, sequential estimation and confidence intervals.

STA 6326—Introduction to Theoretical Statistics I (3) *Prereq: MAC 3314.* Theory of probability. Probability spaces, continuous and discrete distributions, functions of random variables. Expectations, moment and probability generating functions. Applications.

STA 6327—Introduction to Theoretical Statistics II (3) *Prereq: STA 6326.* Properties of point estimators. Least squares, maximum likelihood, and Bayesian procedures. Confidence intervals, multivariate normal distributions, and introduction to the theoretical basis for analysis of variance.

STA 6328—Introduction to Theoretical Statistics III (3) *Prereq: STA 6327.* Tests of hypotheses, decision theory, nonparametric tests.

STA 6466—Probability Theory I (4) *Prereq: MAA 5228 or 6237.* Measure theoretic approach to probability: random variables, probability functions, distribution functions, expectation, characteristic functions.

STA 6467—Probability Theory II (4) *Prereq: STA 6446.* Notions of convergence of sequences of independent random variables: continuity theorem, law of large numbers, central limit theorem.

STA 6468—Probability Theory III (4) *Prereq: STA 6447.* Dependence, Martingale convergence theorem, the law of large numbers and central limit theorems for dependent random variables.

STA 6526—Nonparametric Statistics (4) *Prereq: STA 6328 or consent of instructor.* Hypotheses testing; power and asymptotic relative efficiency of tests. Rank tests, tests of goodness of fit, robust estimators, and order statistics.

STA 6707—The Analysis of Multivariate Data (4) *Prereq: STA 6167 or 6208.* Multivariate normal distribution; discriminant; canonical, principal component; and factor analysis.

STA 6746—Multivariate Analysis I (4) *Prereq: STA 6246.* Singular transformations. Multivariate normal, Wishart and multivariate beta distributions. Properties of a Wishart distributed random matrix. General linear hypothesis. Tests on a normal dispersion matrix.

STA 6747—Multivariate Analysis II (4) *Prereq: STA 6746.* Distribution of the latent roots of a Wishart distributed matrix. Zonal polynomials and noncentral distributions. Current topics in multivariate distribution theory.

STA 6826—Stochastic Processes I (3) *Prereq: STA 6327.* Discrete time and state models. Gambler's Ruin. Persistent and transient states: long-run and stationary distribution mean absorption times, mean first passage times.

STA 6827—Stochastic Processes II (3) *Prereq: STA 6826.* Continuous time, discrete state models. Poisson, generalized Poisson, and filtered Poisson processes. Polya process. Birth and death models. Application to the theory of queues and inventories.

STA 6828—Stochastic Processes III (3) *Prereq: STA 6327.* Weiner-Levy process; Ornstein-Uhlenback process. Integrated processes. White noise and thermal noise. Applications of stochastic processes in physical sciences.

STA 6857—Applied Time Series Analysis (4) *Prereq: STA 4322 and basic FORTRAN.* Linear time series models; statistical analysis of linear stationary and nonstationary time series, with application and case studies supplemented by simulation studies.

STA 6876—Time Series I (4) *Prereq: STA 6447 or 6827.* Statistical theory of stationary time series; estimation and tests of hypotheses concerning spectral density.

STA 6877—Time Series II (4) *Prereq: STA 6876.* Statistical analysis of parametric models; distribution of spectral estimates.

STA 6900—Problems in Statistics (1-5; max: 9) *Prereq: permission of department.* Special problems in research methods, sampling methods, and experimental designs.

STA 6905—Individual Work (1-5; max: 15) *Prereq: permission of department.* Special topics designed to meet the needs and interests of individual students.

STA 6910—Supervised Research (1-5)

STA 6934—Special Topics in Statistics (1-4; max: 12) *Prereq: permission of graduate adviser.*

STA 6937—Seminar: Current Topics in Statistics (1-4; max: 8) *Prereq: permission of department.* Discussion of current research topics in statistics not covered in regular courses. S/U.

STA 6938—Seminar (1) *Prereq: permission of department.* Special topics of an advanced nature suitable for seminar treatment but not given in regular courses. S/U.

STA 6940—Supervised Teaching (1-5)

STA 6971—Research for Master's Thesis (1-15)

STA 7346—Statistical Inference I (4) *Prereq: STA 6328.* Statistical decision theory; minimax theorem, complete class theorem, sufficiency, invariance, and unbiasedness.

STA 7347—Statistical Inference II (4) *Prereq: STA 7346.* Hypothesis testing and multiple decision problems.

STA 7348—Statistical Inference III (4) *Prereq: STA 7347.* Inference with large samples, asymptotic relative efficiency, locally most powerful tests with special reference to nonparametric procedures. Sequential analysis in a general decision theoretic framework.

STA 7980—Research for Doctoral Dissertation (1-15)

SUBJECT SPECIALIZATION TEACHER EDUCATION

College of Education

GRADUATE FACULTY 1979-80

Chairman: E. A. Todd. *Graduate Coordinator:* E. J. Bolduc, Jr. *Professors:* E. J. Bolduc, Jr.; G. D. Carr; J. D. Casteel; T. W. Hipple; J. J. Koran, Jr.; V. McGuire; W. Olson; M. B. Rowe; E. A. Todd. *Associate Professors:* D. H. Bernard; R. C. Ferguson; M. E. Flannery; J. W. Gregory; C. L. Hallman; C. A. Henderson; E. L. Kantowski; A. P. Newcomb, Jr.; R. G. Wright. *Assistant Professors:* B. R. Ellis; M. E. Timmerman.

The Department of Subject Specialization Teacher Education is composed of the following specializations: art education, business education,* English education, foreign language education, mathematics education, music education, science education, and social studies education.

The department offers the Master of Education (nonthesis) and the Master of Arts in Education (thesis) degrees with an emphasis in teaching at any level of education. Advanced graduate degrees, Ed.S., Ed.D., and Ph.D., are offered in all of the areas listed above.

Beyond the Graduate School requirements, beginning graduate students should have appropriate undergraduate training in professional education and in a field of subject specialization. Each graduate student is counseled during the first quarter to develop a program suited to meet specific educational objectives and designed to remove any deficiencies in previous preparation.

For curriculum courses in Elementary Education, Middle School Education, and Secondary School Education, see the Department of General Teacher Education. For general curriculum and instruction courses at the advanced level, see the Department of Instructional Leadership and Support.

General Courses

EDG 6910—Supervised Research (1-5)
EDG 6971—Research for Master's Thesis (1-15)
EDG 7980—Research for Doctoral Dissertation (1-15)
EDH 6053—The Community Junior College in America (4) Programs, issues, and problems.
ESE 6215—The Secondary School Curriculum (4) Scope, function, and types of secondary school curricula and ways of improving existing programs.
ESE 6905—Individual Work (2-5; max: 15) For advanced students who wish to study problems in secondary education under faculty guidance.
ESE 6939—Special Topics (2-5; max: 15) *Prereq: permission of department chairman.*
ESE 6940—Supervised Teaching (1-5)

Art Education

ARE 5313—Teaching Art in Elementary School I (4) *For in-service teachers. Not open to students who have taken ARE 3312.* Study of art expression based on an understanding of child development. Laboratory, lecture, visual aids, class discussion, and individual projects.
ARE 5315—Teaching Art in Elementary School II (4) *For in-service teachers. Prereq: ARE 3312 or 5313 or equivalent.* Laboratory experiences with materials. Emphasis upon ways of developing art experiences with children. Individual and group projects.
ARE 6047—Foundations of Art Education (4) Evolution of art education in the United States and abroad.
ARE 6141—Aesthetic Experience (4) Applied aesthetics. Nature of education for aesthetic experience; education of feeling. Development of a curriculum for aesthetic education.
ARE 6148—Curriculum in Art Education (4) Current major theories in development of the art curriculum.
ARE 6388—The Teaching of Art in Higher Education (4) College programs in art: objectives, problems, and approaches to teaching.
ARE 6648—Art Education and Related Disciplines (4) Comparative analysis of concepts derived from related disciplines and their functions in art education. Art education within the larger framework of professional education.

Business Education

BTE 6371—Methods and Materials for Block-Time Instruction in Office Education (4) Development of instructional plans where large blocks of time are used. Emphasis on developing concept of integrated or whole-office model and instructional materials for use in classrooms.
BTE 6373—Materials and Methods of Teaching General Business (4) Objectives, content, resource materials, and methods of teaching general business in junior and senior high schools.
BTE 6378—Teaching Bookkeeping and Consumer Business Subjects (4) Curriculum, materials, and methods of teaching bookkeeping, economics of business, business law, salesmanship, and business arithmetic.
BTE 6379—Teaching Secretarial Studies (4) For teachers of business subjects. Curriculum, materials, and methods of teaching secretarial subjects.
BTE 6671—Problems in Business Education (4) Areas of interest to students enrolled are studied. Emphasis on problems in business education in Florida schools.
BTE 6935—Research Seminar in Business Education (4) *Prereq: STA 3013.* Nature and purpose of research in business education. Guides for conducting research. Dissemination of research findings.
BTE 6948—Seminar and Work Experience in Business Education (8) *Prereq: permission of department.* Evaluation of effectiveness of the secondary school business education program in meeting needs of students for beginning office employment.
EVT 6949—Cooperative Education (4) Organization and coordination of diversified cooperative training, distributive education, and cooperative business education programs.

**Only advanced graduate degree programs are available in business education. These programs are administered through the Division of Curriculum and Instruction.*

English Education

LAE 6225—Teaching Literature in the Middle School (4) Methods of teaching literature appropriate for the middle school grades.
LAE 6237—Teaching Adolescent Literature in the Secondary School (4) Explorations into what adolescent literature is and into the theory and practice of teaching it in grades 7-12.
LAE 6265—Teaching Composition Skills (4) Selected theories and practices in the teaching of composition skills in grades 7-14.
LAE 6301—Early Childhood Language Arts and Reading (4) *Prereq: RED 5310 or LAE 6319.* Factors influencing early language and their relationship to beginning school programs in listening, speaking, reading, and writing.
LAE 6319—Language Arts in the Elementary School (4) Speaking, listening, writing, and language study in the elementary classroom.
LAE 6365—Language Arts: Language and Composition (4) *Prereq: preparation in subject area equivalent for high school certification and an appropriate methods course.* Theory and practice of teaching literature, grades 7 to 14.
LAE 6366—Language Arts: Literature (4) *Prereq: preparation in subject area equivalent for high school certification and an appropriate methods course.* Theory and practice of teaching literature, grades 7 to 14.
LAE 6714—Children's Literature in the Childhood Curriculum (4) *Prereq: ENG 4161.* Evaluating, selecting, and using fiction, biography, poetry, and informational books for instructional, informational, and recreational purposes.
LAE 6945—Practicum in Teaching Secondary School English (4; max: 8) *Prereq: LAE 6319 or 6301, or consent of instructor.* Directed field experiences based on a planned instructional unit including materials, student activities, teaching strategies, and assessment.
LAE 7936—Seminar in English Language Arts (4; max: 8) *Prereq: LAE 6319 or year of graduate study.* Contemporary developments and research in language arts education.

Foreign Language Education

FLE 6337—Problems of Foreign Language Instruction in Secondary Schools (4) *Prereq: an appropriate methods course.* Surveys new methodology and materials through videotapes of selected teaching situations.
FLE 6934—Bilingual Bicultural Education (4) Principles and practices in the field of bilingual-bicultural education in the U.S. and in other nations. Examination of theories and practices related to issues, analysis of problems, curricular strategies.
FLE 6946—Practicum in Teaching Secondary School Foreign Languages (4; max: 8) *Prereq: FLE 6337.* Directed field experiences with various content emphases based on planned instructional units including materials, student activities, teaching strategies, and means of assessment.
FLE 7148—Problems and Readings in Bilingual-Bicultural Education (2; max: 12) Research and literature dealing with issues, curricular planning and evaluation, and with experimentation focused on roles and problems of instructional leaders and teacher trainers.

Mathematics Education

MAE 5318—Teaching Modern Math in Elementary School (4) Analysis of content, methodology, and materials for teaching modern mathematics.
MAE 6115—Mathematics in the Elementary School (4) *Prereq: MAE 5318.* Recent research, patterns of curriculum, techniques of teaching, and use of instructional media. Primarily for elementary teachers who desire specialization in mathematics education.
MAE 6138—Mathematics in the Secondary School (4) *Prereq: preparation in subject area equivalent to requirements*

for high school certification and an appropriate methods course. Patterns of mathematics curriculum; practices in teaching mathematics; preparation, selection, and use of instructional materials; laboratory experiences and classroom teaching.

MAE 6345—Teacher Verbal Behavior in the Mathematics Classroom (4) Systematic analysis of teacher-pupil verbal interaction in mathematics lessons. Acquisition of technical presentation skills through microteaching. For teachers of mathematics at any level.

MAE 6512—Laboratory in Diagnosing Mathematics Skills (4-8; max: 8) Diagnosis, correction, and prevention of mathematical learning difficulties; work with children in the applications of principles under study.

MAE 6615—Individualizing Instruction in Elementary Mathematics (4) Organizing a continuous progress program: objectives, diagnostic testing, placement of students, record keeping, evaluation, and reporting. Includes study of the role of the teacher and team teaching as well as the development of a bank of materials, games, and activities for an individualized mathematics program.

MAE 6636C—Laboratory Approach to Mathematics (3-6) Rationale for use of investigatory experiences with objects in the mathematics curriculum. Involvement in planning laboratory facilities and activities for classroom use. Analysis of the problems of teaching mathematics to low achievers.

MAE 6947—Practicum in Teaching Secondary School Mathematics (4; max: 8) *Prereq: MAE 6138 or consent of instructor.* Directed field experiences emphasizing various instructional strategies, with a focus on instructional materials, sequencing student activities, and systematizing instructional moves.

MAE 7899—Mathematics Education Seminar (4) *Prereq: MAE 6138.* Issues and problems in mathematics education and the investigation and planning of research relevant to selected problems.

Music Education

MUE 6080—Foundations of Music Education (4) Historical development and philosophy; comparison of United States with other countries and cultures; individuals, associations, and institutions that shape the music education program.

MUE 6146—Band Music in the Public Schools (4) *Offered only by extension. In-service training course open only to instrumental music teachers.* Research work under the supervision of the chairman of the Department of Music.

MUE 6147—Orchestra Music in the Public Schools (4) *Offered only by extension. In-service training course open only to instrumental music teachers.* Research work under supervision of the chairman of the Department of Music.

MUE 6406—Music in the Elementary School (4) *Offered only by extension. In-service training course open to elementary school teachers.* Research work under supervision of the chairman of the Department of Music.

MUE 6416—Vocal Music in the Secondary School (4) *Offered only by extension. In-service training course open only to vocal music teachers.* Research work under supervision of the chairman of the Department of Music.

MUE 7938—Music Education Seminar (4) Contempoary issues and problems in music education and the investigation and planning of research relevant to selected problems.

Science Education

SCE 5115—Teaching Science in Elementary School (4) Basic course for in-service teachers. Emphasis on science content, methods, and materials for elementary school children.

SCE 6117—Science Education in the Elementary School (4) Current problems, new materials and teaching techniques, research and recent developments in the sciences.

SCE 6140—The Teaching of Special Science Programs (3-6; max: 15) Preparation to teach particular science programs such as AAAS, ESS, SCIS, ESCS Patterns and Processes, CHEMS, PSSC, CAI.

SCE 6237—Science in the Secondary School (4) *Prereq: preparation in subject area equivalent to requirements for high school certification and an appropriate methods course.* Current problems in teaching science in secondary schools and junior college.

SCE 6736—Evaluating Science Curricula in the Secondary School (4) Applications of curriculum evaluation theory and systems to contemporary science curricula.

SCE 6947—Practicum in Secondary Science Curriculum (4) Directed field experience emphasizing the adoption and utilization of science curricula in the secondary schools, with a focus on instructional materials and teacher behavior.

SCE 7238—Learning and Instruction in Secondary School Science (4) Selected topics in the acquisition of knowledge in science and the arrangement of conditions for science learning in the secondary schools.

SCE 7933—Science Education Seminar (4) *Prereq: SCE 6117.* Issues and problems in science education and the investigation and planning of research relevant to selected problems.

SCE 7949—Practicum in Learning and Instruction in Secondary School Science (4) Systematic research in learning science in the secondary school setting including the observation and modification of teacher behavior.

Social Studies Education

EDS 6100—Group Process in Education (4) Group organization and operation, with opportunity to develop skills in group leadership and interpretation of group interaction.

EDS 6925—Workshop in Human Relations in Education (3-9; max: 9) Principles and practices in the field of human relations and their implications for interpersonal and intergroup problems in the family, school, and community.

SSE 6045—Perspectives in Social Studies Education (4) Seminar in the analysis of works written by important social studies educators.

SSE 6117—Social Studies Education-Elementary School (4) *Prereq: graduate curriculum course.* Contributions of social education to the total elementary school program, with emphasis on social interaction and programs and procedures in social studies area.

SSE 6133—Social Studies in the Secondary School (4) *Prereq: preparation in subject area equivalent to requirements for high school certification and an appropriate methods course.* Problems of teaching social studies.

SSE 6377C—Practicum in Secondary Social Studies Instruction (4; max: 8) *Prereq: an appropriate methods course.* Identification, definition, application, and synthesizing of component skills relevant to social studies instructions.

SSE 6398—Analysis and Evaluation of Social Studies Instruction (4) *Prereq: an appropriate methods course.* Definition, identification, consequential analysis, and application of microcriteria of teacher effectiveness related to secondary social studies instruction.

SSE 7939—Seminar in Social Studies (4) *Open to advanced degree students in social studies education.* Application of theoretical analysis for program development and teaching strategies in social studies.

TAXATION
College of Law

GRADUATE FACULTY 1979-80

Chairman & Graduate Coordinator: J. J. Freeland. *Professors:* J. J. Freeland; S. A. Lind; C. D. Miller.

Graduate study in the field of taxation leading to the degree Master of Laws in Taxation is available in the College of Law. Applicants for admission to the Graduate School for this degree must hold a law degree from an accredited law school but need not submit scores on the Graduate Record Examination. For further information concerning admission consult the *College of Law Catalog,* or write the Tax Office, 325 Holland Law Center.

LAW 7602—Income Taxation I (3) Tax problems of individual taxpayers; concepts of gross income; identification of taxpayer; adjusted gross income; deductions, exemptions and taxable income.

LAW 7603—Income Taxation II (3) Problems incident to the sale, exchange, and other disposition of property, including recognition and characterization concepts.

LAW 7604—Tax Accounting (3) Income tax accounting principles: the taxable year, accounting methods, installment and deferred payment sales, delayed payment for services, income averaging and loss carry-overs and carry-backs.
LAW 7607—Income Taxation of Natural Resources (3) Examination of the Federal income taxation of the extractive industries (oil and gas, solid minerals) and timber; classification and consequences of conveyance transactions; cost and percentage depletion; geological and geophysical costs; intangible drilling and development costs; mine exploration and development expenditures.
LAW 7611—Corporate Taxation I (3) Tax considerations in corporate formation, distributions, redemptions, and liquidations. General consideration of tax alternatives relating to sale of corporate businesses.
LAW 7612—Advanced Corporate Taxation (3) Advanced problems including Subchapter S corporations, professional corporations, personal holding companies and punitive taxes on earnings accumulation, collapsible corporations, and taxing affiliated groups.
LAW 7613—Corporate Reorganization (3) Reorganizations: mergers, consolidations, and division, including transfer or inheritance of losses and other tax attributes.
LAW 7614—U.S. Taxation of Foreign Persons and Income (3) Applications of the federal income tax to nonresident aliens and foreign corporations and to United States citizens, residents, and corporations investing funds abroad or conducting business with foreign persons.
LAW 7617—Partnership Taxation (3) Tax meaning of "partnership"; formation transactions between partner and partnership; determination and treatment of partnership income; sales or exchange of partnership interest; distributions; retirement; death of a partner; drafting the partnership agreement.
LAW 7623—Estate and Gift Taxation (4) Federal taxes on estates and gifts and generation-skipping transfers.
LAW 7624—Fiduciary Income and Tax Payment (3) Problems of the fiduciary in allocation of receipts and disbursements between principal and income in the administration of trusts and estates; Uniform Principal and Income Act; allocation of the burden of death taxes.
LAW 7625—Income Taxation of Trusts and Estates (3) Taxation of income of trusts and estates, with emphasis on income required to be distributed currently, equivocal distributions of income or corpus, and accumulation distributions; other fiduciary tax problems, including the treatment of income in respect of decedents.
LAW 7626—Estate Planning (3) Estate planning: planning lifetime and testamentary private and charitable dispositions of property; postmortem planning; life insurance; analysis of small and large estates; eliminating and offsetting complicating and adverse factors; selection of a fiduciary and administrative provisions.
LAW 7632—Deferred Compensation (3) Tax consequences of compensation in forms other than cash paid contemporaneously with performance of services. Includes uses of employers' stock in employee compensation, nonqualified deferral compensation devices, and qualified pension and profit-sharing plans.
LAW 7633—Tax Exempt Organizations (3) Study of exemption from federal income tax accorded to a variety of public and private organizations, and tax treatment of contributions to such organizations; public policies underlying exemption from tax, and deductibility of contributions; and the broad new enforcement powers to be undertaken by the Internal Revenue Service.
LAW 7640—Civil Tax Procedure (3) Taxpayer's relationships with the Internal Revenue Service, including requests for rulings, conference and settlement procedures; deficiencies and their assessment; choice of forum; Tax Court practice; limitation periods and their mitigation; transferee liability; tax liens; and civil penalties.
LAW 7641—Procedures in Tax Fraud Cases (3) Criminal offenses and methods of proof; investigative authority of the IRS; summons enforcement proceedings; search warrants and grand jury subpoenas; contitutional defenses to the compulsory production of evidence; the attorney-client privilege and other objections available to taxpayers and third parties.
LAW 7650—State and Local Taxation (3) Nature and purpose of state taxation; comparison of property and excise taxes; uniformity of taxation; jurisdiction; assessment and collection procedures; remedies available to taxpayers.
LAW 7905—Individual Study (1-5) May be repeated. S/U.
LAW 7910—Supervised Research (1-5)
LAW 7911—Federal Tax Research (1-2) Substantial research and writing project on a federal tax subject; instruction in tax research techniques. Students customarily register for the course and complete the project during three successive quarters. Credit is usually one hour each quarter but may be varied in accordance with scope and nature of project. A, H, or S/U.
LAW 7931—Current Federal Tax Problems (3; max: 6) Variable content. Course involves either significant new legislation or significant developments within the existing statutory framework; emphasis on policy considerations.

THEATRE
College of Fine Arts

GRADUATE FACULTY 1979-80

Chairman: E. J. Hooks. *Graduate Coordinator:* R. L. Green. *Associate Professors:* R. Brandman; R. L. Green; E. J. Hooks; A. Wehlburg. *Assistant Professors:* D. L. Shelton; G. L. West.

The graduate programs offered by the Department of Theatre lead to the degrees of Master of Fine Arts and Doctor of Philosophy. The Master of Fine Arts degree permits specialization either in scene design, costume, technical theatre, dance/stage movement, or acting and directing. The Doctor of Philosphy degree with a major in theatre is awarded through the Department of Speech.

An appropriate undergraduate background in theatre, or its equivalent, is prerequisite to admission to the graduate program. In the case of deficiencies, students will be required to register for appropriate "foundations" courses. Admission to the program requires proof or demonstration of production or acting skills.

Assistantships, fellowships, and non-Florida tuition waivers are available.

ORI 6430—Theories of Interpretative Reading (4) Psychological and philosophical theories of creative, artistic oral reading; the teaching of interpretative reading; practice in reading from the works of selected modern authors.
THE 5116—Theatre History I (4) In-depth study of the development of the theatre from its beginning through the Middle Ages.
THE 5117—Theatre History II (4) The Middle Ages to the 18th century.
THE 5118—Theatre History III (4) The 18th century to the present.
THE 5949—Individual Cooperative Work Experience (5-12)
THE 6200—Studies in Contemporary American Theatrical Practices (4) *Prereq: THE 5118, 6204, TPA 6219.* Production techniques of the American Theatre since World War II.
THE 6203—American Plays, Players, and Playwrights I (4) Plays and their production from the colonial period to 1860; techniques of outstanding actors and playwrights.
THE 6204—American Plays, Players, and Playwrights II (4) American plays and players from 1860 to present.
THE 6230—Styles in Theatrical Art I (4) *Prereq: THE 5116, 5117, 5118.* Styles of dramatic art through the Middle Ages.
THE 6231—Styles in Theatrical Art II (4) *Prereq: THE 6230.* Styles of dramatic art from the Middle Ages through 1850.
THE 6232—Styles in Theatrical Art III (4) *Prereq: THE 6231.* Styles of dramatic art from 1850 to the present.
THE 6234—Studies in Contemporary European Theatrical Practices (4) *Prereq: THE 5118, TPA 6219.* Production techniques of the Continental theatre since World War II.
THE 6285—Readings in Theatre History I (4) Selected prima-

ry source materials in the history of the theatre to 1660 and their use by theorists and historians.
THE 6286—Readings in Theatre History II (4) Selected primary source materials in the history of the theatre from 1660 to the present and their use by theorists and historians.
THE 6287—Art History of the Theatre (4; max: 8) Seminar in changing physical and visual conventions in the theatre, their origins in the visual traditions of the culture, and their effect on the modes of dramatic presentation.
THE 6560—Seminar in Dramatic Theory and Criticism (4) Development and growth of dramatic theory and criticism from Aristotle, Plato, Nietzsche, and Croce toward the modern innovations and application.
THE 6561—Seminar in Theatre Aesthetics II (4) Development and modification of aesthetic theory from the Renaissance to the present.
THE 6905—Individual Study (1-10; max: 10) *Prereq: consent of major professor and department chairman.* Project or research course.
THE 6910—Supervised Research (1-5; max: 15) *Prereq: consent of instructor and department chairman.*
THE 6913—Theatre Research (4) *Prereq: permission of the department chairman.* Lecture and project course in the more complex problems in theatre.
THE 6940—Supervised Teaching (1-5; max: 15) *Prereq: consent of instructor and department chairman.*
THE 6971—Research for Master's Thesis (1-15)
THE 6973—Individual Project (1-15) Max. 9 credits applicable toward degree. Creative project in lieu of written thesis.
TPA 5048—Production in Costume Design (4) *Prereq: TPA 4231 and 4232 or consent of instructor.* Advanced application of costume design to costume requirements fostered by specific production concepts.
TPA 5063—Scene Design II (4) *Prereq: TPA 4063 and/or permission of chairman.* Freehand Drawing. Continuation of advanced study of scene design as an art; consideration of the spatial and aesthetic factors operative in the scenic elements, with special emphasis on pragmatic consideration of the design process.
TPA 5081—Scene Painting (4) *Prereq: Permission of the instructor.* Scene painting is an introduction to color vocabulary, color theory, and color composition. Student will learn painting and rendering technique for the stage.
TPA 5084—Scene Design I (4) Advanced study of scene design as an art: consideration of the spatial and aesthetic factors operative in the scenic elements, with special emphasis on pragmatic consideration of the design process.
TPA 5100—Architecture and Decoration for the Stage (4) *Prereq: TPA 4100 and permission of the instructor.* A survey of architectural styles and decorative motifs throughout history. Project will require research, development, and ability to abstract from various theatrical genres.
TPA 6023—Seminar and Practicum in Modern Theatre Design and Practice (4; max: 12) Design, lighting, and costume.
TPA 6029—Advanced Lighting Design (4) *Prereq: TPA 3220, TPA 4024, TPA 5084, or consent of instructor.* Advanced study of stage lighting as an art form with practical supervised designs.
TPA 6085—Advanced Problems in Scene Design (5) Application of production theories to the problems of scene design and supervised problems in advanced scene design.
TPA 6087—Costume Management (4) *Prereq: TPA 4230, 4231, 4232 or equivalent, and consent of instructor.* Development of professional skills essential to management of a costume shop and and total costume program. Emphasis on practical skills required, workshop operation and procedures, and coordination of workshop operation with other production departments.
TPA 6219—Backgrounds in Modern Theatre Practice (4) *Prereq: THE 5118.* Plays and production techniques of the modern continental theatre.
TPA 6275—Advanced Equipment Utilization (5) *Prereq: TPA 3200, 3010, 3220 or consent of instructor.* Designed to enable the advanced student to become conversant with the uses of special theatre construction equipment.
TPA 6935—Seminar in Productive Theory (4) Application of contemporary dramatic theories and production concepts.
TPP 5192—Graduate Acting I (4) Study of acting styles and their relation to theatre aesthetics.
TPP 5294L—Summer Repertory Theatre (1-12) *Prereq: TPP 3112, TPA 3010, TPA 4024, TPA 4232, and/or consent of staff.* A practical production experience in repertory theatre with direct skills application in all areas of theatre production and special emphasis on problems of organizing a multi-production repertory program.
TPP 5512—Musical Theatre III (4) *Prereq: TPP 3511 and/or permission of Department.* The advanced development of acting, singing, and dancing skills, culminating in the presentation of a musical comedy revue.
TPP 6140—Playwriting I (4) *Prereq: Permission of instructor.* A theoretical and practical introduction to the writing of plays. The course deals with the writer's vision and its possible components — intellectual and emotional, aesthetic and ethical.
TPP 6193—Graduate Acting II (4) *Prereq: Acting I, II, III or equivalent, and consent of instructor.* Designed for graduate students specializing in the areas of acting and directing. Affords advanced theoretical study of classical acting styles and studio projects involving their development and use.
TPP 6234—Acting Ensemble (4-12) *Prereq: TPP 6193 or equivalent, and consent of instructor.* Students explore acting theories through intensive experiments and practicum assignments in acting.
TPP 6921—Directing Workshop (4-12) *Prereq: TPP 3650, 3310, 3311 or equivalent, TPP 6934, and consent of instructor.* Intensive exploration of specialized directing techniques, with directing projects involving varied production styles and dramatic forms.
TPP 6934—Advanced Stage Direction (5) Application of production theories to the problems of play direction and a supervised problem in advanced directing techniques.

URBAN AND REGIONAL PLANNING
College of Architecture

GRADUATE FACULTY 1979-80

Chairman & Graduate Coordinator: E. M. Starnes. *Professors:* E. R. Bartley; C. Feiss *(Visiting);* J. W. Milliman; E. M. Starnes; W. L. Weismantel. *Associate Professors:* J. F. Alexander; O. F. Wetterqvist.

The Department of Urban and Regional Planning offers graduate work leading to the degree of Master of Arts in Urban and Regional Planning (M.A.U.R.P.). Students are permitted to enter the program at the beginning of any quarter during the academic year. The program is usually completed in two academic years. The student entering with an undergraduate degree and no graduate study must complete 72 hours of credit for the M.A.U.R.P. Students who have earned graduate credit in related fields may transfer up to 27 quarter hours toward the 72 hour requirement with consent of the department. Prerequisite to admission to the M.A.U.R.P. program is a baccalaureate degree in architecture, planning, engineering, landscape architecture planning, or urban studies. However, the department encourages students with other degrees who show evidence of education and experience in planning and policy sciences to apply for admission.

The urban and regional planning curriculum uses a comprehensive planning or decision model as a basic strategy shaping and guiding core studies. These studies include planning theory, history of cities and planning, urban and regional form, quantitative methods, design and practive for planners, land use and infrastructure, urban economic systems, evaluation, and plan implementing methods. The program is recognized by the American Planning Association for having achieved the highest applicable standards for a graduate planning program. Graduates of the program will be prepared for full professional standing in

urban and regional planning practice. The department and the College of Law offer a joint study program. The Departments of Urban and Regional Planning and Architecture additionally offer a program in planning and preservation.

In addition to course work the student is required to take a one quarter internship with a public or private planning agency and successfully complete a comprehensive examination and thesis. The thesis is included in the required 72 hours. The department reserves the right to retain student work for the purposes of record, exhibition, or instruction.

ECP 5614—Urban Economics (5) *Prereq. ECO 2013-2123, or by permission of the instructor.* Economic analysis of urbanization and original interdependence. Applicability of location theory and other economic analysis. Criteria for determining public expenditures and allocating costs in urban areas.

URP 6061—Professional Administration (4) Explores contemporary policy-making responsibility as shared between citizen organizations and government; prepares future planning director or consultant to distribute staff resources for various plan making responsibilities.

URP 6101—Planning Theory (4) Explores various theories of planning such as disjointed incrementalism, advocacy planning, pluralism, with emphasis on a comprehensive planning model.

URP 6102—Planning Design I (4) Elementary lectures, reading, and exercises in project and neighborhood planning/design and related communication techniques.

URP 6103—Planning Design II (4) *Prereq: URP 6102 or equivalent.* Advanced lectures, reading and exercises in design in urban and regional planning/design. The focus will vary and will be determined jointly by prospective students and the instructor. May be repeated once.

URP 6131—Community Development Powers I (4) Introduction to regulatory and non-regulatory mechanisms of comprehensive plan implementation. Relationship of law and politics to the planning process. The police power as the basis for regulation. Mandatory planning and status of adopted comprehensive plans.

URP 6132—Community Development Powers II (4) In depth consideration of traditional approaches to the regulation of of land use — zoning, subdivision regulation, construction codes, mapped streets, controls and the like.

URP 6133—Community Development Powers III (4) *Prereq: URP 6131 and 6132.*

URP 6203—Critical Observation (4) Techniques of qualitative, humanistic processing of material; skills such as firsthand observing, and open-ended interviewing essential to fact gathering phase of planning or replanning.

URP 6231—City Models (4) *Coreq: EES 5007, ESI 6526, or URP 6821.* Systems models dealing with effects of design or policy alternatives by simulating and measuring their impacts on natural, man-made, and social subsystems.

URP 6261—Regiometrics (4) Collection and use of numerical measurements of urban and regional phenomena and methods of problem identification and monitoring.

URP 6271—Planning Information Systems (4) *Prereq: URP 6261.* Advanced work in planning and analysis using large data bases with emphasis on development monitoring systems and information systems in planning.

URP 6301—Urban Project (1-12; max: 12) Program preparation and design of renewal and expansion projects featuring the weaving together of many networks, facilities, and landscape elements which make up a city. H.

URP 6311—Regional Project (1-12; max: 12) Design at the metropolitan regional, and state scales where urban settlement is to be balanced with extensive uses of land, such as agriculture, forestry, and wetlands. H.

URP 6312—Land Use Planning (4) Standards, criteria, policies, design techniques, and research systems used in designating proposed general distribution; location and extent of the uses of land and of population densities for all public and private land use categories as established by law, regulation, and social and economic justification at all levels of government in the U.S. and abroad.

URP 6331—Component Project (1-12; max: 12) Such a studio examines only one component or aspect of visible society, such as frankitecture (franchises) or migrant farm employment. H.

URP 6341—New Program Project (1-12; max: 12) Explores one of the State of Florida or federally sponsored programs. H.

URP 6421—Environmental Impact Statements (4) Management and decision-making aspects of impact statements under the U.S. Environmental Protection Act, Florida's Land and Water Management Act of 1972, and as a component of a comprehensive planning process.

URP 6700—The Capital Web (4) Determining location, size, and appearance of community facilities, circulation, and utilities networks; the city as private investments and activities attached to the deliberately arranged, commonly owned capital web.

URP 6801—The Urban Ideal (4) Historic and future city form as an expression of civilized aspiration; teaches the origins and recurring popularity of protourban forms such as the plaza; the ceremonial axis; the citadel.

URP 6802—20th Century City and Regional Planning (4) City and regional planning concepts and institutions from the City Beautiful movement of the 1900s to current programs are taught as alternative plan making strategies.

URP 6811—Community Values and Goals (4) Investigation of values and goals achievable through common effort, and techniques of community self-evaluation and goal determination.

URP 6821—Urban and Regional Systems (4) A quantitative computer-assisted exploration of a comprehensive planning model.

URP 6905—Exploration and Directed Study (1-5; max: 15)

URP 6910—Supervised Research (1-5) S/U option.

URP 6931—Topical Seminar (2-5; max: 9) Considers a current planning opportunity or issue.

URP 6940—Supervised Teaching (1-5) S/U.

URP 6971—Research for Master's Thesis (1-15) S/U.

URP 6979—Terminal Project (1-9) This option, in lieu of thesis, accommodates a physical design or plan project which because of its map and graphic content does not fit comfortably within a thesis format. A total of nine credits, in a three-six sequence, is recommended. H.

COLLEGE OF VETERINARY MEDICINE —IFAS

College of Agriculture

GRADUATE FACULTY 1979-80

Dean: C. E. Cornelius. *Graduate Coordinator:* F. H. White. *Professors:* E. L. Besch; R. E. Bradley, Sr.; P. T. Cardeilhac; C. E. Cornelius; M. Drost; G. T. Edds; K. N. Gelatt; R. R. Gronwall; J. A. Himes; R. F. Kahrs; P. L. Nicoletti; C. F. Simpson; F. H. White. *Associate Professors:* H. N. Becker; G. A. Berkhoff; M. J. Burridge; C-L D. Chen; C. L. Chrisman; W. S. Cripe; D. J. Forrester; F. C. Neal; J. T. Neilson; W. P. Palmore. *Assistant Professors:* M. L. Bruss; J. M. Gaskin; D. M. Hyde; N. E. Noonan.

Programs leading to the Doctor of Philosophy with emphasis on animal disease problems may be obtained through other departments including Animal Science, Microbiology and Cell Science, and Zoology with faculty members from the College of Veterinary Medicine—IFAS directing the program.

A sound background in basic sciences is required for admission.

The College of Veterinary Medicine—IFAS offers programs for the degree of Master of Science. Areas of emphasis include microbiology, parasitology, pathology, pharmacology, physiology, toxicology, and laboratory animal diseases.

VES 5302—Veterinary Parasitology I (5) *Prereq: ZOO 2010,*

3203, 3703, MCB 3013, ENY 4660C or consent of instructor. Selected parasitic diseases of animals, including etiology, transmission, pathogenesis, host reaction, and related research techniques.
VES 5303—Veterinary Parasitology II (5) *Prereq: VES 5302 or consent of instructor.* Continuation study of selected parasitic diseases of animals, including diagnostic methods, therapy, prevention and control, and related research techniques.
VES 6242C—Veterinary Physiology I (5) *Prereq: ZOO 2010, 2011, BCH 5723 or comparable courses.* Lecture and laboratory presentation of general physiologic principles, including elements of cell physiology and a systems approach to cardiovascular, blood, respiratory, and renal physiology.
VES 6243C—Veterinary Physiology II (5) *Prereq: VES 6242C.* Includes physiology of the gastrointestinal tract, metabolism, endocrinology, neuroendocrinology, and neurophysiology.
VES 6322—Helminthology (5) *Prereq: ZOO 4235 or equivalent.* Morphology, life cycles, and physiology of helminths. Emphasis on host-parasite relationship, immune responses, and related research techniques.
VES 6342—Immunology of Animal Parasites (5) *Prereq: BCH 5753, 5051, ZOO 4235 or consent of instructor.* Biological and biochemical aspects of host resistance and immunity to endoparasites.
VES 6362—Parasitic Diseases of the Tropics and Subtropics (5) Animal parasitology covering mechanisms of parasitic infections, physiology of parasites, and immune responses of the host.
VES 6402—Veterinary Microbiology (6) *Prereq: MCB 6236, 4203, 6506 or equivalent and consent of instructor.* Laboratory identification of selected bacterial and viral pathogens of veterinary importance.
VES 6503—Veterinary Pathology (5) *Prereq: degree in one of the medical sciences; suitable background in histology and approval of major professor.* Topics in pathologic conditions affecting animals, with emphasis on cellular changes.
VES 6602—Veterinary Toxicology I (5) *Prereq: VES 6652 and suitable background in biochemistry, physiology, and pharmacology.* Effects of toxic natural products and chemicals on animals.
VES 6603—Veterinary Toxicology II (5) *Prereq: VES 6602.*
VES 6651—Veterinary Pharmacology I (5) *Prereq: suitable background in the medical sciences; satisfactory work in physiology, biochemistry, and immunology.* Selected problems in prevention, treatment, and control of animal diseases.
VES 6652—Veterinary Pharmacology II (5) *Prereq: VES 6651.*
VES 6761—Animal Surgical Techniques (4) *Prereq: VES 6242C or BMS 7142 and consent of instructor.* General surgical principles and anesthesiology including pre- and postoperative care of experimental animals. Selected surgical procedures useful in biomedical research performed to develop surgical skills.
VES 6765—Veterinary Research Techniques (5) Principles of biophysical sciences, and their application to veterinary medical science.
VES 6905—Problems in Veterinary Science (1-5; max: 10)
VES 6910—Supervised Research (1-5)
VES 6931—Seminar in Veterinary Science (1; max: 6)
VES 6940—Supervised Teaching (1-5)
VES 6971—Research for Master's Thesis (1-15)

ZOOLOGY
College of Liberal Arts and Sciences

GRADUATE FACULTY 1979-80

Chairman: T. C. Emmel. *Graduate Coordinator:* R. M. Dewitt. *Graduate Research Professors:* A. F. Carr:, E. S. Deevey, Jr. *Professors:* W. Auffenberg; L. Berner; P. Brodkorb; W. E. S. Carr; J. C. Dickinson, Jr.; T. C. Emmel; J. W. Hardy; F. C. Johnson II; D. W. Johnston; J. H. Kaufmann; F. J. S. Maturo, Jr.; B. K. McNab; D. Nicol; F. G. Nordlie; H. O. Schwassmann; S. D. Webb; M. J. Westfall, Jr. *Associate Professors:* J. F. Anderson; R. M. Dewitt; J. T. Giesel; C. R. Gilbert; S. R. Humphrey; C. A. Lanciani; J. Reiskind; H. M. Wallbrunn; R. G. Wolff. *Assistant Professors:* S. A. Bloom; H. J. Brockmann; M. L. Crump; P. Feinsinger; P. O. Lawrence; B. J. MacFadden.

The Department of Zoology offers the degrees of Master of Science in Teaching, Master of Science, and Doctor of Philosophy with specialization in animal behavior, ecology, genetics, paleontology, physiology, and systematic biology. Specific areas of specialization include evolutionary biology, marine biology, population biology, and tropical biology.

New graduate students should have completed undergraduate courses in ecology, embryology, comparative anatomy, invertebrate and vertebrate zoology, genetics, physiology, one year of physics, chemistry through organic, and a sequence in mathematics or statistics. These courses constitute a core curriculum for all candidates for a graduate degree.

Each new graduate student will be given a written screening examination covering the zoological portion of the core curriculum by the departmental examining committee early in the first term of residence. The results of this examination will be used in planning the student's program.

APB 5415C—Radioisotope Theory and Techniques (5) *Prereq: CHM 3120C or consent of instructor.* Theory of radioactivity, interaction with matter, and radioactive decay given in sufficient detail to make the laboratory techniques and practices thoroughly understood.
EXP 6108—Survey of Sensory Systems (4) *Prereq: PCB 4745C or BMS 6510 or GMS 7760.* A group of specialists provide a survey of theories and experimental data on human and subhuman sensory reception and encoding. Auditory, visual, and the chemical and cutaneous senses are included.
EXP 6109—Seminar in Sensory Processes (1) Topics of current interest in various areas of sensory specialties.
GLY 6615—Advanced Invertebrate Paleontology (4) *Prereq: GLY 4610.* Local field problems in paleoecology or biostratigraphy.
GLY 6660—Paleoecology (4) *Prereq: GLY 4610 or ZOO 3203.* Paleoautecology, paleosynecology, historical biogeography of marine invertebrates, and ecological rules as applied to fossil invertebrates.
PCB 5317C—Marine Ecology (5) *Prereq: ZOO 3203C; CHM 2047C or equivalent.* Marine communities and the physical and chemical factors that influence them.
PCB 5415C—Behavioral Ecology (5) *Prereq: ZOO 3803C or PCB 4044C.* Behavioral adaptations of animals to their natural environment.
PCB 5487—Analytical Techniques in Marine Ecology (2) *Prereq: Introduction to parametric statistics; basic ecology course.* Introduction to multivariate and computer assisted analyses of marine community data, specifically classification, ordination, and stability analyses. Emphasis is placed on interpretations and implications to biological systems.
PCB 5545—Physiological Genetics (4) *Prereq: PCB 3063 or equivalent.* Nature of the gene, and its role in metabolism, specificity, differentiation, and morphological patterns.
PCB 6049—Seminar in Ecology (2) *Prereq: PCB 4044C, 6447C.*
PCB 6069—Topics in Genetics (2-4; max: 12)
PCB 6307C—Limnology (5) *Prereq: PCB 4044C, CHM 2047C.* Biological, chemical, and physical dynamics of inland waters.
PCB 6357C—Tropical Biology: An Ecological Approach (12) Field study of ecological concepts in tropical environments. Offered in Costa Rica as part of the program of the Organization for Tropical Studies.
PCB 6377C—Physiological Ecology of Vertebrates (5) *Prereq: PCB 4745C.* Physiological mechanisms that influence distribution and ecological relations, water conservation, and energy exchange in vertebrates.
PCB 6379—Seminar in Physiological Ecology (1-4) *Prereq: PCB 4745C, or PCB 6377C or equivalent.* Topics of current in-

terest in the physiological ecology or environmental and comparative physiology of animals.

PCB 6447C—Community Ecology (5) *Prereq: PCB 4044C.* Selected animal habitats, their occupants and organization. Classroom work evaluates community concept and appraises role of ecology in evolution.

PCB 6448C—Pollination Ecology (5) *Prereq: consent of instructor.* Interactions between plants and animal pollinators from an ecological and evolutionary perspective, at individual, population, and community levels.

PCB 6496C—Stream Ecology (5) *Prereq: ENY 3004, PCB 4044C or 3043C, CHM 2047C, PHY 2052.* Physical, chemical, and biological interrelationships in flowing fresh water.

PCB 6577C—Ecological Genetics (5) *Prereq: PCB 3063, PCB 4044C, STA 6166.* Mutation, migration, selection, density, subdivision, behavior, and maintenance of variability as they affect the genetic structure of natural populations.

PCB 6686C—Experimental Population Ecology (4) Consideration of empirical tests of hypotheses concerning population dynamics, competition, and predation.

PCB 6796C—Comparative Sensory Physiology (5) *Prereq: PCB 4745C or equivalent and consent of instructor.* Classical concepts and modern research concerning the neurophysiological basis of invertebrate and vertebrate behavior.

PSB 6607—Research Methods in the Sensory Systems (4; max: 8) *Prereq: BMS 6512 or EXP 610B.* Participation in laboratory experiments typical of several major areas of sensory systems. Includes visual, auditory, chemical, and somesthetic and pain sensory specialties.

ZOO 5115C—Vertebrate Paleontology (4) *Prereq: ZOO 3703C.* Evolutionary history of major vertebrate groups, with special emphasis on principles of prehistoric investigations.

ZOO 5405C—The Biology of Marine Animals (4) *Prereq: organic chemistry, general physics, ZOO 3203C.* Functioning and interrelationships of marine animals considered from the standpoint of comparative physiology.

ZOO 6116C—Ancient Vertebrate Faunas (4) *Prereq: ZOO 5115C.* Evolution, distribution, and extinction of vertebrate faunas, with emphasis on problems in paleoecology, paleogeography, and patterns of phylogeny.

ZOO 6126—Historical Ecology of the Pleistocene (4) Pleistocene environments and ecosystems with emphasis on worldwide chronology and correlation, and intermediate-term historical processes that required 10^2 to 10^4 years for significant expression.

ZOO 6207C—Advanced Invertebrate Zoology (5) *Prereq: ZOO 3203C.* Morphology, physiology, development, and life cycles of selected invertebrate groups, with emphasis on the minor phyla.

ZOO 6246C—Helminthology (5) *Prereq: ZOO 4235C or equivalent.* Morphology, life cycles, and physiology of helminths. Emphasis on host-parasite relationship; immune responses, and related research techniques.

ZOO 6336C—Principles of Systematic Zoology (4) Theory of biological classification and taxonomic practice. Laboratory experience in taxonomic procedures and techniques, including computer methods.

ZOO 6416C—Biology of the Amphibia (5) *Prereq: ZOO 3033C.* Evolution, morphology, physiology, and behavior of amphibians.

ZOO 6456C—Ichthyology (5) *Prereq: ZOO 3303C.*

ZOO 6466C—Biology of the Reptilia (5) *Prereq: ZOO 3303C.* Systematics, life cycles, and behavior of reptiles.

ZOO 6476C—Ornithology (4) *Prereq: ZOO 3303C.*

ZOO 6486C—Mammalogy (5) *Prereq: ZOO 3303C.*

ZOO 6506C—Ethology (4) *Prereq: ZOO 3513C.* History, concepts, and methods of the comparative study of animal and human behavior. The biological substrate and classification of behavior.

ZOO 6816—Zoogeography (3)

ZOO 6857C—Advanced Tropical Zoology (12) Vertebrate or invertebrate group selected as basis for studies of ecological systems in the tropics. Effects of elevation and temperatures on populations, successions, microhabitat, distribution, predation, evolution, and other aspects. Offered in Costa Rica as part of the program of the Organization for Tropical Studies.

ZOO 6905—Individual Studies (1-5; max: 20) *S/U.*

ZOO 6910—Supervised Research (1-5)

ZOO 6927—Special Topics in Zoology (1-5)

ZOO 6939—Seminar in Animal Behavior (1-4) *Prereq: PCB 5415C or consent of instructor.* Special behavioral topics.

ZOO 6940—Supervised Teaching (1-5)

ZOO 6971—Research for Master's Thesis (1-15)

ZOO 7980—Research for Doctoral Dissertation (1-15)

GRADUATE FACULTY

(Listing Professional Rank and Graduate Department)

ABBOTT, ELIZABETH F., Ph.D. (University of Florida)
Assistant Professor, Geography

ABBOTT, THOMAS B., Ph.D. (University of Florida)
Professor, Speech

ABDEL-KHALIK, RASHAD A., Ph.D. (University of Illinois)
Professor, Accounting

ABRAMS, ROBERT M., Ph.D. (University of Pennsylvania)
Associate Professor, Obstetrics and Gynecology

ACHEY, PHILLIP M., Ph.D. (Pennsylvania State University)
Associate Professor, Microbiology and Cell Science

ADAMS, CALVIN K., Ph.D. (Kansas State University)
Assistant Professor, Psychology

ADAMS, EARNEST D., Ph.D. (Duke University)
Professor, Physics

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Associate Professor, Building Construction

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Professor, Radiology

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Associate Professor, Statistics

AGRESTI, BARBARA F., Ph.D. (University of Florida)
Visiting Assistant Professor, Sociology

AHMED, ESAM M., Ph.D. (University of Maryland)
Professor, Food Science and Human Nutrition

AHTOLA, OLLI T., Ph.D. (University of Illinois)
Assistant Professor, Marketing

ALBRIGO, LEO G., Ph.D. (Rutgers State University)
Professor, Horticultural Science

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Professor, Microbiology and Cell Science

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Associate Professor, Architecture

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Assistant Professor, Foundations of Education

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Professor, Entomology and Nematology

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Assistant Professor, Agronomy

ALLEN, ROBERT E., Ed.D. (University of Florida)
Professor, Professional Physical Education

ALTMAIER, ELIZABETH M., Ph.D. (Ohio State University)
Assistant Professor, Psychology

ALVAREZ, JOSE, Ph.D. (University of Florida)
Assistant Professor, Food and Resource Economics

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Assistant Professor, Counselor Education

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Associate Professor, Materials Science and Engineering

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Assistant Professor, Marketing

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Associate Professor, English

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Associate Professor, Zoology

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Professor, Finance and Insurance

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Professor, Engineering Sciences

ANDERSON-SHANKLIN, GENE C., Ph.D. (University of Wisconsin)
Professor, Nursing

ANDREW, CHRIS O., Ph.D. (Michigan State University)
Professor, Food and Resource Economics

ANDREWS, CHARLES P., Ph.D. (Louisiana State University)
Assistant Professor, Horticultural Science

ANDREWS, SAMUEL D., Ph.D. (University of Connecticut)
Associate Professor, Foundations of Education

ANGORN, RICHARD A., J.D. (University of Florida)
Associate Professor, Pharmacy

ANTHONY, DARRELL W., Ph.D. (University of Florida)
Professor, Entomology and Nematology

ANTHONY, DAVID S., Ph.D. (University of Wisconsin)
Professor, Botany

ANTONINI, GUSTAVO A., Ph.D. (Columbia University)
Professor, Latin American Studies

APPLEDORF, HOWARD, Ph.D. (Massachusetts Institute of Technology)
Professor, Food Science and Human Nutrition

ARAFA, ABDEL-MONI S., Ph.D. (Mississippi State University)
Assistant Professor, Poultry Science

ARAUJO, OSCAR E., Ph.D. (Purdue University)
Professor, Pharmacy

ARAUJO, PAUL E., Ph.D. (Brown University)
Assistant Professor, Food Science and Human Nutrition

ARCHER, WAYNE R., Ph.D. (Indiana University)
Assistant Professor, Finance, Insurance, Real Estate and Urban Land Studies

ARDITTI, FRED D., Ph.D. (Massachusetts Institute of Technology)
Professor, Economics

ARIET, MARIO, Ph.D. (University of Florida)
Professor, Industrial and Systems Engineering

ARMSTRONG, HELENJANE, Ph.D. (Oregon State University)
Associate Professor, Geography

ARNOLD, CALVIN E., Ph.D. (Michigan State)
Professor, Horticultural Science

ARRINGTON, LEWIS R., Ph.D. (University of Florida)
Professor, Animal Science

ARVANITIS, LOUKAS G., Ph.D. (University of California at Irvine)
Professor, Forest Resources and Conservation

ASHAMALLA, MEDHAT G., M.D. (University of Alexandria)
Assistant Professor VA, Psychiatry

ASHLEY, THOMAS R., Ph.D. (University of California at Berkeley)
Assistant Professor, Entomology and Nematology

ASHTON, PATRICIA T., Ph.D. (University of Georgia)
Associate Professor, Foundations of Education

ASQUITH, RICHARD L., D.V.M. (Michigan State University)
Associate Professor, Animal Science

ATTAWAY, JOHN A., Ph.D. (Duke University)
Professor, Horticultural Science

AUFFENBERG, WALTER, Ph.D. (University of Florida)
Professor, Zoology

AUGUSTINE, JIMMY J., Ph.D. (University of California)
Assistant Professor, Horticultural Science

AUXTER, THOMAS P., Ph.D. (Bryn Mawr College)
Associate Professor, Philosophy

AVILA, DONALD L., D.Ed. (University of Nebraska)
Professor, Foundations of Education

AYOUB, ELIA M., M.D. (American University of Beirut)
Professor, Immunology and Medical Microbiology

BACHMAN, KERMIT C., Ph.D. (University of Maryland)
Associate Professor, Dairy Science

BACON, PHILIP, Ph.D. (University of Tennessee)
Associate Professor, Mathematics

BAER, HERMAN, M.D. (University of Basel)
Associate Professor, Immunology and Medical Microbiology

BAGNALL, LARRY O., Ph.D. (Cornell University)
Associate Professor, Agricultural Engineering

BAILEY, LYNN B., Ph.D. (Purdue University)
Assistant Professor, Food Science and Human Nutrition

BAILEY, ROBERT L., M.S.E. (University of Florida)
Associate Professor, Electrical Engineering

BAILEY, THOMAS L., Ph.D. (University of Chicago)
Professor, Physics

BAIRD, BRIDGET B., Ph.D. (Bryn Mawr College)
Assistant Professor, Mathematics

BAIRD, CARL D., Ph.D. (University of Florida)
Associate Professor, Agricultural Engineering

BAKER, AMANDA S., Ph.D. (University of Florida)
Associate Professor, Nursing

BAKER, EARL J., Ph.D. (University of Colorado)
Associate Professor, Geography

BAKER, JR., FRANK S., M.S.A. (University of Florida)
Professor, Animal Science

BAKER, SUSAN R., Ph.D. (Harvard University)
Associate Professor, Romance Languages and Literatures

BALANOFF, NEAL, Ph.D. (Northwestern University)
Professor, Dentistry

BALL, JOE C., Ph.D. (University of California at Berkeley)
Assistant Professor, Entomology and Nematology

BALLARD, STANLEY S., Ph.D. (University of California at Irvine)
Distinguished Service Professor, Physics

BARANOWSKI, RICHARD M., Ph.D. (University of Connecticut)
Professor, Entomology and Nematology

BARFIELD, CARL S., Ph.D. (Texas A&M University)
Assistant Professor, Entomology and Nematology

BARGER, BENJAMIN, Ph.D. (Duke University)
Professor, Psychology

BARKSDALE, E. C., Ph.D. (Ohio State University)
Associate Professor, Germanic and Slavic Languages and Literatures

BARMORE, CHARLES, Ph.D. (University of Florida)
Associate Professor, Horticultural Science

BARNETT, RONALD D., Ph.D. (Purdue University)
Associate Professor, Agronomy

BARRETT, JAMES E., Ph.D. (Michigan State University)
Assistant Professor, Horticultural Science

BARRICK, WILLIAM E., Ph.D. (Michigan State University)
Assistant Professor, Horticultural Science

BARRON, DONALD H., Ph.D. (Yale University)
Professor, Physiology

BARTHOLIC, JON F., Ph.D. (South Dakota State University)
Professor, Horticultural Science

BARTLEY, ERNEST R., Ph.D. (University of California at Berkeley)
Professor, Urban and Regional Planning

BARTON, PAULINE H., D.Ed. (University of Florida)
Professor, Nursing

BARTZ, JERRY A., Ph.D. (University of Wisconsin)
Associate Professor, Plant Pathology

BASS, RONALD K., Ph.D. (Michigan State University)
Associate Professor, Dentistry

BASSETT, MARK J., Ph.D. (University of Maryland)
Associate Professor, Horticultural Science

BATES, ROBERT P., Ph.D. (Massachusetts Institute of Technology)
Professor, Food Science and Human Nutrition

BATTISTE, MERLE A., Ph.D. (Columbia University)
Professor, Chemistry

BAUGHMAN, RONALD A., M.S.D. (Indiana University)
Professor, Dentistry

BAUSHER, MICHAEL G., Ph.D. (University of Florida)
Adjunct Assistant Professor, Horticultural Science

BAZER, FULLER W., Ph.D. (University of North Carolina)
Professor, Animal Science

BEAUGRANDE, ROBERT A., Ph.D. (University of California at Irvine)
Assistant Professor, English -

BECHTEL, GORDON G., Ph.D. (University of Michigan)
Professor, Marketing

BECKER, HAROLD N., M.S. (University of Illinois)
Associate Professor, Veterinary Medicine

BEDNAREK, ALEXANDER R., Ph.D. (University of Buffalo)
Professor, Mathematics

BEEGHLEY, II, LEONARD, Ph.D. (University of California at Riverside)
Associate Professor, Sociology

BEEMAN, CARL E., Ed.D. (Cornell University)
Professor, Agricultural and Extension Education

BELAR, CYNTHIA D., Ph.D. (Ohio University)
Assistant Professor, Clinical Psychology

BELL, AFESA M., Ph.D. (University of Utah)
Associate Professor, Psychology

BENGSTON, JOHN K., Ph.D. (University of Toledo)
Assistant Professor, Foundations of Education

BERARDO, FELIX M., Ph.D. (Florida State University)
Professor, Sociology

BERG, SANFORD V., Ph.D. (Yale University)
Associate Professor, Economics

BERG, WILLIAM K., Ph.D. (University of Wisconsin)
Associate Professor, Psychology

BERGER, RICHARD D., Ph.D. (University of Wisconsin)
Professor, Plant Pathology

BERGERON, RAYMOND J., Ph.D. (Brandeis University)
Associate Professor, Medicinal Chemistry

BERKHEISER, VAUGHN E., Ph.D. (Michigan State University)
Assistant Professor, Soil Science

BERKHOFF, GERMAN A., Ph.D. (Cornell University)
Associate Professor, Veterinary Medicine

BERNARD, DONALD H., Ed.D. (Columbia University)
Associate Professor, Subject Specialization Teacher Education

BERNER, LEWIS, Ph.D. (University of Florida)
Professor, Zoology

BERNS, KENNETH I., Ph.D. (Johns Hopkins University)
Professor, Immunology and Medical Microbiology

BERNSTEIN, JERALD J., Ph.D. (University of Michigan)
Professor, Neuroscience

BERTRAND, JOSEPH E., Ph.D. (Louisiana State University)
Professor, Animal Science

BESCH, EMERSON L., Ph.D. (University of California at Berkeley)
Professor, Animal Science

BEVIS, HERBERT A., Ph.D. (University of Florida)
Professor, Environmental Engineering Sciences

BEYETE, THOMAS K., Ph.D. (University of Texas at Austin)
Associate Professor, English

BIEBER, THEODORE I., Ph.D. (New York University)
Professor, Chemistry

BIERY, JOHN C., Ph.D. (Iowa State University)
Professor, Chemical Engineering

BIGELOW, GORDON E., Ph.D. (Johns Hopkins University)
Professor, English

BIGGS, ROBERT H., Ph.D. (Purdue University)
Professor, Horticultural Science

BIRDSELL, DALE C., Ph.D. (University of California at Riverside)
Associate Professor, Immunology and Medical Microbiology

BISPLINGHOFF, RAYMOND L., Ph.D. (Swiss Federal Institute of Technology)
Professor, Engineering Sciences

BITTON, GABRIEL, Ph.D. (Hebrew University)
Associate Professor, Environmental Engineering Sciences

BLAIR, ROGER D., Ph.D. (Michigan State University)
Professor, Economics

BLAIR, TIMOTHY R., Ph.D. (University of Illinois)
Assistant Professor, Instructional Leadership and Support

BLAKEMORE, JOHN S., Ph.D. (University of London)
Professor, Physics

BLAKESLEE, GEORGE M., Ph.D. (Duke University)
Assistant Professor, Forest Resources and Conservation

BLAKEY, ARCH F., Ph.D. (Florida State University)
Associate Professor, History

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Professor, Geology

BLASHFIELD, ROGER K., Ph.D. (Indiana University)
Associate Professor, Clinical Psychology

BLEIWEIS, ARNOLD S., Ph.D. (Pennsylvania State University)
Professor, Microbiology and Cell Science

BLEVINS, DON, Ph.D. (University of Michigan)
Assistant Professor, Mathematics

BLOCK, A. J., M.D. (Johns Hopkins University)
Professor, Medicine

BLOCK, LOUIS S., Ph.D. (Northwestern University)
Associate Professor, Mathematics

BLOCK, SEYMOUR S., Ph.D. (Pennsylvania State University)
Professor, Chemical Engineering

BLOOM, STEPHEN A., Ph.D. (University of Washington)
Assistant Professor, Zoology

BLUE, WILLIAM G., Ph.D. (University of Missouri)
Professor, Soil Science

BLUME, ROBERT A., Ph.D. (University of Michigan)
Professor, General Teacher Education

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Professor, Sociology

BODINE, JR., WILLIS R., M.M. (University of Texas at Austin)
Professor, Music

BODOR, NICHOLAS S., Ph.D. (Babes-Bolyai University)
Professor, Medicinal Chemistry

BOLCH, JR., WILLIAM E., Ph.D. (University of California at Berkeley)
Professor, Environmental Engineering Sciences

BOLDEN, BERNADINE J., Ph.D. (University of Florida)
Assistant Professor, Instructional Leadership and Support

BOLDUC, JR., ELROY J., Ed.D. (University of Tennessee)
Professor, Subject Specialization Teacher Education

BOLLET, ROBERT M., Ed.D. (Ball State University)
Assistant Professor, Counselor Education

BOMBERGER, WILLIAM A., Ph.D. (Brown University)
Associate Professor, Economics

BONNEVILLE, DOUGLAS A., Ph.D. (Ohio State University)
Professor, Romance Languages and Literatures

BOOTE, KENNETH J., Ph.D. (Purdue University)
Associate Professor, Agronomy

BOTTCHER, ADELBERT B., Ph.D. (Purdue University)
Assistant Professor, Agricultural Engineering

BOWES, GEORGE E., Ph.D. (London University)
Associate Professor, Botany

BOWLES, RICHARD W., M.S. (University of Wisconsin)
Professor, Music

BOWMAN, THOMAS T., Ph.D. (Tulane University)
Assistant Professor, Mathematics

BOYCE, RICHARD P., Ph.D. (Yale University)
Professor, Biochemistry and Molecular Biology

BOYD, CLIFFORD A., Ed.D. (Boston University)
Professor, Professional Physical Education

BOYETT, JAMES M., Ph.D. (Michigan State University)
Assistant Professor, Statistics

BOYKIN, JR., WILLIAM H., Ph.D. (Stanford University)
Professor, Engineering Sciences

BOYLES, JESSE V., Ph.D. (University of Florida)
Assistant Professor, Accounting

BOYSEN, PHILIP G., M.D. (Loyola College)
Assistant Professor VA, Professional Physical Education

BRACKBILL, YVONNE, Ph.D. (Stanford University)
Graduate Research Professor, Psychology

BRADDOCK, ROBERT J., Ph.D. (Michigan State University)
Associate Professor, Food Science and Human Nutrition

BRADLEY, SR., RICHARD E., Ph.D. (University of Georgia)
Professor, Veterinary Medicine

BRANCH, MARC N., Ph.D. (University of Maryland)
Associate Professor, Psychology

BRANDMAN, RUSSELLA, Ph.D. (Florida State University)
Associate Professor, Theatre

BRANTLEY, RICHARD E., Ph.D. (Princeton University)
Associate Professor, English

BRASK, WILLARD J., M.M. (University of Michigan)
Professor, Music

BRAYLAN, RAUL C., M.D. (Buenos Aires University)
Associate Professor, Pathology

BRECHNER, BEVERLY L., Ph.D. (Louisiana State University)
Associate Professor, Mathematics

BRECKE, BARRY J., Ph.D. (Cornell University)
Assistant Professor, Agronomy

BREDAHL, JR., AXEL C., Ph.D. (University of Pittsburgh)
Associate Professor, English

BREIVOGEL, WILLIAM F., Ed.D. (Rutgers State University)
Associate Professor, General Teacher Education

BRELAND, HERMAN L., Ph.D. (University of Illinois)
Professor, Soil Science

BREY, JR., WALLACE S., Ph.D. (University of Pennsylvania)
Professor, Chemistry

BREZONIK, PATRICK L., Ph.D. (University of Wisconsin)
Professor, Environmental Engineering Sciences

BRIGHAM, EUGENE F., Ph.D. (University of California at Berkeley)
Graduate Research Professor, Finance, Insurance, Real Estate, and Urban Land Studies

BROCKMANN, H. J., Ph.D. (University of Wisconsin)
Assistant Professor, Zoology

BRODKORB, PIERCE, Ph.D. (University of Michigan)
Professor, Zoology

BROGDON, JAMES E., M.S. (University of Florida)
Professor, Entomology and Nematology

BROLMANN, JOHN B., Ph.D. (University of Florida)
Assistant Professor, Agronomy

BROOKBANK, JOHN W., Ph.D. (California Institute of Technology)
Professor, Microbiology and Cell Science

BROOKE, DONALD L., Ph.D. (University of Illinois)
Professor, Food and Resource Economics

BROOKEMAN, VALERIE A., Ph.D. (University of St. Andrews)
Professor VA, Nuclear Engineering Sciences

BROOKS, ROBERT F., Ph.D. (University of Wisconsin)
Professor, Entomology and Nematology

BROOKS, HAROLD K., Ph.D. (Harvard University)
Professor, Geology

BROOKS, JAMES K., Ph.D. (Ohio State University)
Professor, Mathematics

BROWN, DELINDUS R., Ph.D. (Indiana University)
Associate Professor, Speech

BROWN, GEORGE E., Ph.D. (University of Minnesota)
Professor, Plant Pathology

BROWN, JR., WILLIAM S., Ph.D. (State University of New York)
Associate Professor, Speech

BROWNELL, WILLIAM E., Ph.D. (University of Chicago)
Assistant Professor, Neuroscience

BROWNING, CHARLES B., Ph.D. (Kansas State University)
Professor, Animal Science

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Assistant Professor, Computer and Information Science

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Professor, Physics

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Professor, Geography

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Assistant Professor, Physics

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Assistant Professor, Veterinary Medicine

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Professor, Horticultural Science

BRYAN, ROBERT A., Ph.D. (University of Kentucky)
Professor, English

BUCHANAN, DAVID W., Ph.D. (Rutgers State University)
Professor, Horticultural Science

BUCHLER, JEAN R., Ph.D. (University of San Diego)
Associate Professor, Physics and Astronomy

BUFFINGTON, DENNIS E., Ph.D. (University of Minnesota)
Associate Professor, Agricultural Engineering

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Professor, Electrical Engineering

BURCHARDT, HANS, Ph.D. (University of Florida)
Assistant Professor, Pathology

BURDITT, JR., ARTHUR K., Ph.D. (University of Minnesota)
Professor, Entomology and Nematology

BUREN, WILLIAM F., Ph.D. (Cornell University)
Professor, Entomology and Nematology

BURNAP, CHARLES A., Ph.D. (Harvard University)
Assistant Professor, Mathematics

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Assistant Professor, Anthropology

BURNS, JAMES F., Ph.D. (Massachusetts Institute of Technology)
Professor, Industrial and Systems Engineering

BURRIDGE, MICHAEL J., Ph.D. (University of California at Davis)
Associate Professor, Veterinary Medicine

BUSBY, WALTER A., Ed.D. (Michigan State University)
Associate Professor, Foundations of Education

BUSEY, PHILIP, Ph.D. (University of Arizona)
Assistant Professor, Horticultural Science

BUSHNELL, DAVID, Ph.D. (Harvard University)
Professor, History

BUTLER, GEORGE B., Ph.D. (University of North Carolina)
Professor, Chemistry

BUTLER, GLENN A., Ed.D. (Oklahoma State University)
Professor, Journalism and Communications

BUTLER, JERRY F., Ph.D. (Cornell University)
Professor, Entomology and Nematology

BUTT, ARNOLD F., M.Arch. (Rice University)
Professor, Architecture

BUTTON, JAMES W., Ph.D. (University of Texas)
Associate Professor, Political Science

BZOCH, KENNETH R., Ph.D. (Northwestern University)
Professor, Communicative Disorders

CADE, JAMES R., M.D. (University of Texas at Austin)
Professor, Physiology

CAILLER, BERNADETTE A., Ph.D. (Cornell University)
Associate Professor, Romance Languages and Literatures

CALDERWOOD, MARON B., Ph.D. (University of Florida)
Assistant Professor, Pathology

CALDWELL, ROBERT E., Ph.D. (Purdue University)
Professor, Soil Science

CALFEE, DENNIS A., LL.M. (University of Florida)
Associate Professor, Taxation

CALHOUN, JR., FRANK, Ph.D. (University of Florida)
Associate Professor, Soil Science

CALLAHAN, PHILIP S., Ph.D. (Kansas State University)
Professor, Entomology and Nematology

CALVERT, DAVID V., Ph.D. (Iowa State University)
Professor, Soil Science

CAMPBELL, CARL W., Ph.D. (Purdue University)
Professor, Horticultural Science

CAMPBELL, HUGH D., Ph.D. (University of British Columbia)
Associate Professor, Nuclear Engineering Sciences

CAMPBELL, KENNETH L., Ph.D. (Iowa State University)
Associate Professor, Agricultural Engineering

CANGELOSI, JAMES S., Ph.D. (Louisiana State University)
Associate Professor, Instructional Leadership and Support

CANTLIFFE, DANIEL J., Ph.D. (Purdue University)
Associate Professor, Horticultural Science

CAPEHART, BARNEY L., Ph.D. (University of Oklahoma)
Professor, Industrial and Systems Engineering

CARDEILHAC, PAUL T., Ph.D. (University of Pennsylvania)
Professor, Veterinary Medicine

CARLISLE, VICTOR W., Ph.D. (University of Florida)
Professor, Soil Science

CARLSON, DAVID A., Ph.D. (University of Hawaii)
Associate Professor, Entomology and Nematology

CARLSON, GERALD M., Ph.D. (University of Michigan)
Associate Professor, Pharmacology and Therapeutics

CARNELL, CORBIN S., Ph.D. (University of Florida)
Professor, English

CARPENTER, JAMES W., Ph.D (University of Florida)
Professor, Animal Science

CARPENTER, RONALD H., Ph.D. (University of Wisconsin)
Associate Professor, English

CARPENTER, WILLIAM J., Ph.D. (Michigan State University)
Professor, Horticultural Science

CARR, JR., ARCHIE F., Ph.D. (University of Florida)
Graduate Research Professor, Zoology

CARR, GLENNA D., Ed.D. (University of Florida)
Professor, Subject Specialization Teacher Education

CARR, THOMAS D., Ph.D. (University of Florida)
Professor, Physics and Astronomy

CARR, WILLIAM E., Ph.D. (Duke University)
Professor, Zoology

CARRIKER, ROY R., Ph.D. (Virginia Polytechnic Institute)
Assistant Professor, Food and Resource Economics

CARROLL, JR., EDWARD E., Ph.D. (University of Pennsylvania)
Professor, Nuclear Engineering Sciences

CARTER, RANDOLPH L., Ph.D. (Iowa State University)
Assistant Professor, Statistics

CASAGRANDE, JEAN, Ph.D. (Indiana University)
Associate Professor, Romance Languages and Literatures

CASSIN, SIDNEY, Ph.D. (University of Texas at Austin)
Professor, Physiology

CASSISI, NICHOLAS J., M.D. (University of Miami)
Professor, Surgery

CASTEEL, JAMES D., Ph.D. (George Peabody College)
Professor, Subject Specialization Teacher Education

CASTLE, WILLIAM S., Ph.D. (University of Florida)
Assistant Professor, Horticultural Science

CATALDO, EVERITT F., Ph.D. (Ohio State University)
Associate Professor, Political Science

CATO, JAMES C., Ph.D. (University of Florida)
Associate Professor, Food and Resource Economics

CATON, DONALD, M.D. (Columbia University)
Associate Professor, Obstetrics and Gynecology

CENZER, DOUGLAS A., Ph.D. (University of Michigan)
Associate Professor, Mathematics

CERDA, JAMES J., M.D. (University of Maryland)
Professor, Medicine

CHALMERS, DAVID M., Ph.D. (University of Rochester)
Professor, History

CHAMBERS, DERRELL L., Ph.D. (Oregon State University)
Professor, Entomology and Nematology

CHAMEIDES, WILLIAM L., Ph.D. (Yale University)
Assistant Professor, Physics

CHAMPION, JOHN M., Ph.D. (Purdue University)
Professor, Health and Hospital Administration

CHANG, RICHARD T., Ph.D. (University of Michigan)
Professor, History

CHAPMAN, JR., HERBERT L., Ph.D. (Iowa State University)
Professor, Animal Science

CHAPMAN, SHARON K., Ph.D. (University of Florida)
Assistant Professor, Pharmacology and Therapeutics

CHARUDATTAN, RAGHAVAN, Ph.D. (University of Madras)
Associate Professor, Plant Pathology

CHAU, KHE V., Ph.D. (University of California at Berkeley)
Assistant Professor, Agricultural Engineering

CHEEK, JIMMY G., Ph.D. (Texas A & M University)
Assistant Professor, Agricultural and Extension Education

CHEN, CHAO-LING D., Ph.D. (Michigan State University)
Associate Professor, Veterinary Medicine

CHEN, KWAN, Ph.D. (University of Pennsylvania)
Professor, Physics and Astronomy

CHEN, SUSHING, Ph.D. (University of Maryland)
Associate Professor, Mathematics

CHEN, WAYNE H., Ph.D. (University of Washington)
Professor, Electrical Engineering

CHENETTE, EUGENE R., Ph.D. (University of Minnesota)
Professor, Electrical Engineering

CHERRINGTON, BLAKE E., Ph.D. (University of Illinois)
Professor, Electrical Engineering

CHEW, VICTOR, B.Sc. (University of West Australia)
Associate Professor, Statistics

CHILDERS, DONALD G., Ph.D. (University of Southern California)
Professor, Electrical Engineering

CHILDERS, WILLIAM C., Ph.D. (University of Florida)
Professor, English

CHIU, TSAO, Ph.D. (University of Florida)
Professor, Coastal Engineering

CHOATE, RUSH E., M.S.A. (University of Florida)
Professor, Agricultural Engineering

CHOUREY, PREM S., Ph.D. (Indiana University)
Adjunct Assistant Professor, Agronomy

CHRISMAN, CHERYL L., D.V.M. (Michigan State University)
Associate Professor, Veterinary Medicine

CHRISTENSEN, BENT A., Ph.D. (University of Minnesota)
Professor, Civil Engineering

CHRISTIANSEN, KENNETH A., Ed.D. (University of Missouri)
Professor, Journalism and Communications

CHU, CHAUNCEY C., Ph.D. (University of Texas at Austin)
Associate Professor, Romance Languages and Literatures

CHUN, PAUL W., Ph.D. (University of Missouri)
Professor, Biochemistry and Molecular Biology

CLARK, ANTHONY J., Ph.D. (University of Denver)
Associate Professor, Speech

CLARK, JR., ARTHUR E., Ph.D. (University of Florida)
Assistant Professor, Materials Science and Engineering

CLARK, EDGAR W., Ph.D. (University of California at Berkeley)
Professor, Entomology and Nematology

CLARK, HAROLD B., Ph.D. (University of Kentucky)
Professor, Food and Resource Economics

CLARK, III, IRA G., Ph.D. (Northwestern University)
Associate Professor, English

CLARK, PHILLIP A., Ed.D. (Western Michigan)
Associate Professor, Educational Administration and Supervision

CLARK, WILLIAM B., D.D.S. (Emory University)
Assistant Professor, Immunology and Medical Microbiology

CLARKE, WENTWORTH, Ed.D. (University of Nebraska)
Professor, Instructional Leadership and Support

CLARKSON, MARK H., Ph.D. (University of Texas at Austin)
Professor, Engineering Sciences

CLAWSON, THOMAS W., Ed.D. (William and Mary)
Assistant Professor, Counselor Education

CLAYTON, KENNETH C., Ph.D. (Purdue University)
Assistant Professor, Food and Resource Economics

CLEM, LESTER W., Ph.D. (University of Miami)
Professor, Immunology and Medical Microbiology

CLUBOK, ALFRED B., Ph.D. (University of Michigan)
Professor, Political Science

CLUNN, PATRICIA A., Ed.D. (Columbia University)
Assistant Professor, Nursing

COGGINS, WILMER J., M.D. (Duke University)
Professor, Community Health and Family Medicine

COHEN, EDWIN, Ph.D. (University of Iowa)
Associate Professor, Clinical Psychology

COHEN, HOWARD L., Ph.D. (Indiana University)
Associate Professor, Astronomy

COHEN, JOEL B., Ph.D. (University of California at Los Angeles)
Professor, Marketing

COHEN, LOUIS D., Ph.D. (Duke University)
Professor, Clinical Psychology

COHEN, ROBERT J., Ph.D. (Yale University)
Associate Professor, Biochemistry and Molecular Biology

COLBURN, DAVID R., Ph.D. (University of North Carolina)
Associate Professor, History

COLE, SR., THOMAS W., Ed.D. (University of Texas at Austin)
Professor, Educational Administration and Supervision

COLEMAN, SYLVIA E., Ph.D. (University of Florida)
Assistant Professor, Microbiology and Cell Science

COLETTE, W. A., Ph.D. (Iowa State University)
Associate Professor, Food and Resource Economics

COLGATE, SAMUEL O., Ph.D. (Massachusetts Institute of Technology)
Associate Professor, Chemistry

COLLETT, WILLIAM K., Sc.D. (University of Pittsburgh)
Professor, Dentistry

COLLIER, COURTLAND A., M.E. (University of Florida)
Associate Professor, Civil Engineering

COLLIER, ROBERT J., M.S. (East Illinois University)
Assistant Professor, Dairy Science

COLLINS, WILLIAM A., Ph.D. (University of Washington)
Assistant Professor, Accounting

COMBS, JR., GEORGE E., Ph.D. (Iowa State University)
Professor, Animal Science

CONKLIN, JR., JAMES B., Sc.D. (Massachusetts Institute of Technology)
Associate Professor, Physics

CONNELL, JR., RICHARD G., Ph.D. (University of Florida)
Assistant Professor, Materials Science and Engineering

CONNER, JOHN W., Ph.D. (Victoria University)
Distinguished Service Professor, Romance Languages and Literatures

CONOVER, CHARLES A., Ph.D. (University of Georgia)
Professor, Horticultural Science

CONRAD, JOSEPH H., Ph.D. (Purdue University)
Professor, Animal Science

CONRADT, DAVID, Ph.D. (Brown University)
Professor, Political Science

CONROY, STEPHEN S., Ph.D. (University of Iowa)
Associate Professor, History

COOK, ALLYN A., Ph.D. (University of Wisconsin)
Professor, Plant Pathology

COOK, EDWIN A., Ph.D. (Yale University)
Professor, Anthropology

COPELIN, JOHNNY L., Ph.D. (Texas Tech University)
Assistant Professor, Animal Science

CORNELIUS, CHARLES E., Ph.D. (University of California at Riverside)
Professor, Veterinary Medicine

CORNELL, JOHN A., Ph.D. (Virginia Polytechnic Institute)
Professor, Statistics

COUCH, II, LEON W., Ph.D. (University of Florida)
Associate Professor, Electrical Engineering

COULSON, GRACIELA B., Ph.D. (Washington University)
Associate Professor, Romance Languages and Literatures

COURAGE, KEN G., M.S.C.E. (Texas A & M University)
Associate Professor, Civil Engineering

COVEY, C. D., Ph.D. (Louisiana State University)
Professor, Food and Resource Economics

COX, JOSEPH R., Ph.D. (Indiana University)
Associate Professor, Physics

COX, MERLIN G., Ph.D. (University of Florida)
Associate Professor, History

CRAIG, ALAN K., Ph.D. (Louisiana State University)
Associate Professor, Geography

CRAIN, EDWARD E., M.A. (University of Miami)
Professor, Architecture

CRANDALL, CATHERINE A., Ph.D. (Purdue University)
Associate Professor, Pathology

CRANDALL, LEE A., Ph.D. (Purdue University)
Assistant Professor, Sociology

CRANDALL, PHILIP G., Ph.D. (Purdue University)
Assistant Professor, Food Science and Human Nutrition

CRANDALL, RICHARD B., Ph.D. (Purdue University)
Professor, Immunology and Medical Microbiology

CRAVEN, JR., ROY C., M.F.A. (University of Florida)
Professor, Art

CREEL, AUSTIN B., Ph.D. (Yale University)
Professor, Religion

CREWS, CLIFTON E., Ph.D. (University of Georgia)
Assistant Professor, Horticultural Science

CREWS, HARRY E., M.Ed. (University of Florida)
Professor, English

CREWS, RUTHELLEN, Ed.D. (Columbia University)
Professor, Instructional Leadership and Support

CRIPE, WYLAND S., D.V.M. (University of California at Davis)
Associate Professor, Veterinary Medicine

CRISMAN, THOMAS L., Ph.D. (Indiana University)
Assistant Professor, Environmental Engineering Sciences

CRIST, RAYMOND E., Ph.D. (University of Grenoble)
Professor (Emeritus), Geography

CRISTESCU, NICOLAE, D.M.P.. (University of Bucharest)
Graduate Research Professor, Engineering Sciences

CROCKER, LINDA M., Ph.D. (Michigan State University)
Associate Professor, Foundations of Education

CROCKETT, JOE R., Ph.D. (University of Florida)
Associate Professor, Animal Science

CROMROY, HARVEY L., Ph.D. (University of North Carolina)
Professor, Entomology and Nematology

CROSS, CLARK I., Ph.D. (University of Washington)
Professor, Geography

CRUM, ROY L., Ph.D. (University of Texas at Austin)
Assistant Professor, Finance, Insurance, Real Estate, and Urban Land Studies

CRUMP, MARTHA L., Ph.D. (University of Kansas)
Assistant Professor, Zoology

CUNNINGHAM, WALTER R., Ph.D. (University of Southern California)
Associate Professor, Psychology

CURRAN, ROBERT L., Ed.D. (Harvard University)
Professor, Foundations of Education

CURREY, WAYNE L., Ph.D. (University of Connecticut)
Associate Professor, Agronomy

CURTIS, CLAYTON C., Ph.D. (Indiana University)
Associate Professor, Finance, Insurance, Real Estate and Urban Land Studies

CUTLER, WILLIAM H., Ph.D. (University of Southern California)
Assistant Professor, Speech

D'AMICO, ROBERT, Ph.D. (University of Buffalo)
Associate Professor, Philosophy

DALTON, GEORGE R., Ph.D. (University of Michigan)
Professor, Nuclear Engineering Sciences

DAME, DAVID A., Ph.D. (University of Massachusetts)
Professor, Entomology and Nematology

DAMICO, ALFONSO J., Ph.D. (Ohio State University)
Associate Professor, Political Science

DAMICO, SANDRA B., Ph.D. (University of Florida)
Associate Professor, Foundations of Education

DAMRON, BOBBY L., Ph.D. (University of Florida)
Associate Professor, Poultry Science

DASTA, ANTHONY J., M.S. (University of Illinois)
Associate Professor, Architecture

DAUER, MANNING J., Ph.D. (University of Illinois)
Distinguished Service Professor, Political Science

DAVENPORT, THOMAS L., Ph.D. (Texas A & M University)
Assistant Professor, Horticultural Science

DAVIDSON, JAMES M., Ph.D. (University of California at Davis)
Professor, Soil Science

DAVIDSON, JOHN L., Ph.D. (Purdue University)
Associate Professor, Civil Engineering

DAVIDSON, LEONARD M., Ph.D. (Massachusetts Institute of Technology)
Assistant Professor, Management

DAVIES, FREDERICK S., Ph.D. (Cornell University)
Assistant Professor, Horticultural Science

DAVIS, CARLTON G., Ph.D. (Michigan State University)
Associate Professor, Food and Resource Economics

DAVIS, JR., FRANCIS C., Ph.D. (University of Tennessee)
Associate Professor, Microbiology and Cell Science

DAVIS, GEORGE K., Ph.D. (Cornell University)
Professor Emeritus, Animal Science

DAVIS, HORANCE G., M.A. (University of Florida)
Distinguished Service Professor, Journalism and Communications

DAVIS, JR., HUGH C., Ph.D. (University of Tennessee)
Professor, Clinical Psychology

DAVIS, JAMES R., Ph.D. (University of Virginia)
Professor, Economics

DAVIS, JOSEPH S., Ph.D. (State University of Iowa)
Professor, Botany

DAVIS, JOY H., M.Ed. (University of Florida)
Assistant Professor, Nursing

DAVIS, JR., RICHARD H., Ph.D. (University of Wisconsin)
Associate Professor, History

DAWSON, WILLIAM W., Ph.D. (Florida State University)
Professor, Psychology

DE GROVE, JOHN M., Ph.D. (University of North Carolina)
Professor, Political Science

DEAGAN, KATHLEEN A., Ph.D. (University of Florida)
Assistant Professor, Anthropology

DEAKIN, MOTLEY F., Ph.D. (University of California at Berkeley)
Associate Professor, English

DEAL, WILLIAM B., M.D. (University of North Carolina)
Professor, Pharmacy

DEAN, CHARLES E., Ph.D. (University of North Carolina)
Professor, Agronomy

DEERE, DON U., Ph.D. (University of Illinois)
Adjunct Professor, Geology

DEEVEY, JR., EDWARD S., Ph.D. (Yale University)
Graduate Research Professor, Zoology

DEHGAN, BIJAN, Ph.D. (University of California at Davis)
Assistant Professor, Horticultural Science

DEHOFF, ROBERT T., Ph.D. (Carnegie Mellon University)
Professor, Materials Science and Engineering

DENG, JUENCHIN, Ph.D. (University of Georgia)
Associate Professor, Food Science and Human Nutrition

DENNISON, RAYMOND A., Ph.D. (State University of Iowa)
Professor, Food Science and Human Nutrition

DENSLOW, JR., DAVID A., Ph.D. (Yale University)
Associate Professor, Economics

DER HOUSSIKIAN, HAIG, Ph.D. (University of Texas at Austin)
Professor, Romance Languages and Literatures

DETWEILER, JOHN S., Ed.D. (University of Florida)
Professor, Journalism and Communications

DEVINNEY, EDWARD J., Ph.D. (University of Pennsylvania)
Associate Professor, Astronomy

DEW, DONALD, Ph.D. (University of Iowa)
Professor, Speech

DEWITT, ROBERT M., Ph.D. (University of Michigan)
Associate Professor, Zoology

DEWSBURY, DONALD A., Ph.D. (University of Michigan)
Professor, Psychology

DEYRUP, JAMES A., Ph.D. (University of Illinois)
Professor, Chemistry

DIAZ, NILS J., Ph.D. (University of Florida)
Professor, Nuclear Engineering Sciences

DICKERSON, LAUREL, Ph.D. (Michigan State University)
Assistant Professor, Instructional Leadership and Support

DICKSON, DONALD W., Ph.D. (University of North Carolina)
Professor, Entomology and Nematology

DIETRICH, FRANK H., Ph.D. (University of Florida)
Assistant Professor, Statistics

DILLER, GEORGE T., Ph.D. (Stanford University)
Associate Professor, Romance Languages and Literatures

DINCULEANU, NICOLAE, Ph.D. (University of Bucharest)
Professor, Mathematics

DINNING, JAMES S., Ph.D. (Oklahoma State University)
Research Scientist, Food Science and Human Nutrition

DIXON, JAMES C., Ph.D. (University of North Carolina)
Professor, Psychology

DOERING, PAUL L., M.S.P. (University of Florida)
Assistant Professor, Pharmacy

DOHERTY, JR., HERBERT J., Ph.D. (University of North Carolina)
Professor, History

DOLBIER, JR., WILLIAM R., Ph.D. (Cornell University)
Professor, Chemistry

DOMINIAK, KENNETH E., Ph.D. (Polytechnic Institute of Brooklyn)
Associate Professor, Industrial and Systems Engineering

DONELIN, DANIEL W., M.A. (Michigan State University)
Associate Professor, Architecture

DONIVAN, JR., FRANK F., Ph.D. (University of Florida)
Associate Professor, Astronomy

DONNELLY, JR., WILLIAM H., M.D. (University of Ottawa)
Associate Professor, Pathology

DORMAN, PHYLLIS E., Ed.D. (State University of New York)
Associate Professor, Music

DOTY, KEITH L., Ph.D. (University of California at Berkeley)
Associate Professor, Electrical Engineering

DOUGHERTY, MOLLY E., Ph.D. (University of Florida)
Associate Professor, Nursing

DOUGHTY, PAUL L., Ph.D. (Cornell University)
Professor, Anthropology

DOUGLAS, CARROLL R., Ph.D. (University of Tennessee)
Professor, Poultry Science

DOW, JOSE K., Ph.D. (University of Missouri)
Associate Professor, Food and Resource Economics

DOWELL, ROBERT V., Ph.D. (Ohio State University)
Assistant Research Scientist, Entomology and Nematology

DRAKE, DAVID A., Ph.D. (Syracuse)
Associate Professor, Mathematics

DRESDNER, RICHARD D., Ph.D. (Pennsylvania State University)
Professor, Chemistry

DROST, MAARTEN, D.V.M. (Iowa State University)
Professor, Veterinary Medicine

DRUMMOND, WILLIAM H., Ed.D. (Stanford University)
Professor, Instructional Leadership and Support

DUCKWORTH, ALISTAIR M., Ph.D. (Johns Hopkins University)
Associate Professor, English

DUCKWORTH, DONNA H., Ph.D. (Johns Hopkins University)
Associate Professor, Immunology and Medical Microbiology

DUDECK, ALBERT E., Ph.D. (Pennsylvania State University)
Associate Professor, Horticultural Science

DUFTY, JAMES W., Ph.D. (Lehigh University)
Professor, Physics

DUGAN, EDWARD T., Ph.D. (University of Florida)
Visiting Assistant Professor, Nuclear Engineering Sciences

DUGGAN, DENNIS E., Ph.D. (Oregon State University)
Associate Professor, Microbiology and Cell Science

DUNAVANT, BILLY G., Ph.D. (Purdue University)
Professor, Environmental Engineering Sciences

DUNAVIN, LEONARD S., Ph.D. (University of Florida)
Associate Professor, Agronomy

DUNCAN, R. P., Ph.D. (Purdue University)
Associate Professor, Health and Hospital Administration

DUNCAN, WILLIAM G., Ph.D. (Purdue University)
Professor, Agronomy

DUNKLE, JOHN R., Ph.D. (Clark University)
Professor, Geography

DUNN, ADRIAN J., Ph.D. (University of Cambridge)
Associate Professor, Neuroscience

DUNN, BEN M., Ph.D. (University of California at Santa Clara)
Assistant Professor, Biochemistry and Molecular Biology

DUNN, ROBERT A., Ph.D. (Cornell University)
Assistant Professor, Entomology and Nematology

DUNNAM, FRANCIS E., Ph.D. (Louisiana State University)
Professor, Physics

DURRANCE, KENNETH L., M.Ag. (University of Florida)
Professor, Animal Science

DUTOIT, BRIAN M., Ph.D. (University of Oregon)
Professor, Anthropology

DYKES, ELMA E., M.A. (New York University)
Associate Professor, Nursing

DYKES, MARY K., Ph.D. (University of Texas at Austin)
Associate Professor, Special Education

DYRESON, DEL, Ph.D. (University of Denver)
Associate Professor, Geography

DZIUBAN, CHARLES D., Ph.D. (University of Wisconsin)
Professor, Instructional Leadership and Support

EADES, JAMES L., Ph.D. (University of Illinois)
Associate Professor, Geology

EARLY, JOHN D., Ph.D. (Harvard University)
Associate Professor, Anthropology

EASLEY, JOHN F., M.S. (University of Florida)
Assistant Professor, Animal Science

EBCIOGLU, IBRAHIM K., Ph.D. (University of Minnesota)
Professor, Engineering Sciences

EDDS, GEORGE T., Ph.D. (University of Minnesota)
Professor, Veterinary Medicine

EDDY, ELIZABETH M., Ph.D. (Columbia University)
Professor, Anthropology

EDSON, CHARLES G., M.S.E. (University of Florida)
Associate Professor, Engineering Sciences

EDWARDS, BRUCE H., Ph.D. (Dartmouth College)
Assistant Professor, Mathematics

EDWARDSON, JOHN R., Ph.D. (Harvard University)
Professor, Agronomy

EDWARDSON, MICKIE N., Ph.D. (Michigan State University)
Professor, Journalism and Communications

EICHHORN, HEINRICH K., Ph.D. (University of Vienna)
Professor, Astronomy

EISENBERG, MARTIN A., D.Eng. (Yale University)
Professor, Engineering Sciences

ELGERD, OLLE I., D.Sc. (Washington University)
Professor, Electrical Engineering

ELLIOTT, ROGER W., Ph.D. (University of Texas at Austin)
Professor, Computer and Information Sciences

ELLIS, BETTY R., Ed.D. (Wayne State University)
Assistant Professor, Subject Specialization Teacher Education

ELLIS, WILLIAM H., Ph.D. (Florida State University)
Associate Professor, Nuclear Engineering Sciences

ELMSTROM, GARY W., Ph.D. (University of California at Davis)
Associate Professor, Horticultural Science

ELNICKI, RICHARD A., D.B.A. (Harvard University)
Associate Professor, Management

EMERSON, ANN P., M.S. (University of Florida)
Associate Professor, Food Science and Human Nutrition

EMERSON, ROBERT D., Ph.D. (Purdue University)
Associate Professor, Food and Resource Economics

EMMEL, THOMAS C., Ph.D. (Stanford)
Professor, Zoology

ENNEKING, WILLIAM F., M.D. (University of Wisconsin)
Professor, Pathology

ENNIS, JR., WILLIAM B., Ph.D. (University of Wisconsin)
Professor, Agronomy

ENO, CHARLES F., Ph.D. (Purdue University)
Professor, Soil Science

ENOCH, JAY M., Ph.D. (Ohio State University)
Graduate Research Professor, Psychology

ENTNER, MARVIN L., Ph.D. (University of Minnesota)
Associate Professor, History

EPPES, BILL G., M.S. (University of Texas at Austin)
Professor, Building Construction

EPTING, FRANZ R., Ph.D. (Ohio State University)
Professor, Psychology

ESLER, WILLIAM K., Ph.D. (Kent State University)
Professor, Instructional Leadership and Support

EVERETT, PAUL H., Ph.D. (Purdue University)
Professor, Soil Science

EWEL, JOHN J., Ph.D. (University of North Carolina)
Associate Professor, Botany

EWEL, KATHERINE C., Ph.D. (University of Florida)
Assistant Professor, Forest Resources and Conservation

EYLER, JOHN R., Ph.D. (Stanford University)
Associate Professor, Chemistry

FAGERBERG, SIEGFRED W., Ed.D. (University of Southern Mississippi)
Professor, Health Education and Safety

FAHIEN, RAYMOND W., Ph.D. (Purdue University)
Professor, Chemical Engineering

FAIRBANKS, CHARLES H., Ph.D. (University of Michigan)
Distinguished Service Professor, Anthropology

FAIRCHILD, ALEXANDER G., Ph.D. (Harvard University)
Professor, Entomology and Nematology

FAIRCHILD, GARY F., Ph.D. (Texas A & M University)
Assistant Professor, Food and Resource Economics

FARAH, JEAN W., Ph.D. (University of Michigan)
Associate Professor, Materials Science and Engineering

FARBER, ERICH A., Ph.D. (University of Iowa)
Distinguished Service Professor, Mechanical Engineering

FARICY, JOHN H., Ph.D. (University of Minnesota)
Professor, Marketing

FARMER, KATHERINE B., Ph.D. (University of Texas at Austin)
Assistant Professor, Mathematics

FARRAH, SAMUEL R., Ph.D. (Pennsylvania State University)
Assistant Professor, Microbiology and Cell Science

FARRINGTON, WILLIAM S., Ph.D. (Ohio State University)
Associate Professor, Agricultural and Extension Education

FAST, THOMAS B., D.D.S. (Ohio State University)
Professor, Dentistry

FEARN, RICHARD L., Ph.D. (University of Florida)
Professor, Engineering Sciences

FEARNEY, EDWARD M., B.Arch. (Carnegie Mellon University)
Associate Professor, Architecture

FEASTER, JOHN P., Ph.D. (University of North Carolina)
Professor, Animal Science

FEINSINGER, PETER, Ph.D. (University of Florida)
Assistant Professor, Zoology

FEISS, CARL L., M.C.P. (Massachusetts Institute of Technology)
Visiting Professor, Urban and Regional Planning

FELDHERR, CARL M., Ph.D. (University of Pennsylvania)
Professor, Anatomy

FELDMAN, JACK M., Ph.D. (University of Illinois)
Associate Professor, Management

FENNELL, EILEEN B., Ph.D. (University of Florida)
Assistant Professor, Clinical Psychology

FERGUSON, RAYMOND C., M.Ed. (Pennsylvania State University)
Associate Professor, Subject Specialization Teacher Education

FERKOVICH, STEPHEN M., Ph.D. (University of Wyoming)
Adjunct Assistant Professor, Entomology and Nematology

FERNALD, EDWARD A., Ph.D. (Michigan State University)
Associate Professor, Geography

FIELD, FREDERICK P., Ph.D. (University of Florida)
Associate Professor, Pharmacy

FIELDS, MICHAEL J., Ph.D. (Texas A & M University)
Assistant Professor, Animal Science

FILLMER, HENRY T., Ph.D. (Ohio University)
Professor, Instructional Leadership and Support

FINGER, KENNETH F., Ph.D. (University of Wisconsin)
Professor, Pharmacy

FINLAYSON, BIRDWELL, Ph.D. (University of Chicago)
Professor, Surgery

FISCHLER, IRA S., Ph.D. (Stanford University)
Associate Professor, Psychology

FISHER, JR., MARTIN J., Ph.D. (University of West Virginia)
Assistant Professor, Physiology

FISHER, NORMA P., M.A.E. (University of Florida)
Associate Professor, Physical Therapy

FISHER, RICHARD F., Ph.D. (Cornell University)
Associate Professor, Forest Resources and Conservation

FISHER, WALDO R., Ph.D. (University of Pennsylvania)
Professor, Biochemistry and Molecular Biology

FISHKIND, HENRY H., Ph.D. (Indiana University)
Assistant Professor, Economics

FISKELL, JOHN G., Ph.D. (McGill University)
Professor, Soil Science

FITZGERALD, LAWRENCE T., Ph.D. (University of Florida)
Associate Professor, Nuclear Engineering Sciences

FITZGERALD, PAUL W., Ed.D. (Florida State University)
Professor, Counselor Education

FLANEGAN, JAMES B., Ph.D. (University of Michigan)
Assistant Professor, Immunology and Medical Microbiology

FLANNERY, MERLE E., Ed.D. (Pennsylvania State University)
Associate Professor, Subject Specialization Teacher Education

FLOWERS, JOHN W., Ph.D. (University of Virginia)
Professor, Physics and Astronomy

FLUCK, RICHARD C., Ph.D. (University of North Carolina)
Professor, Agricultural Engineering

FOCKS, DANA A., Ph.D. (University of Florida)
Adjunct Assistant Professor, Entomology and Nematology

FOGLER, HENRY R., Ph.D. (Columbia University)
Professor, Management

FOLTZ, JOHN L., Ph.D. (University of Michigan)
Assistant Professor, Entomology and Nematology

FOODYM, DARALYN, J., Ph.D. (University of California at Berkeley)
Assistant Professor, Community Health and Family Medicine

FORD, HARRY W., Ph.D. (Ohio State University)
Professor, Horticultural Science

FOREMAN, JR., RONALD C., Ph.D. (University of Illinois)
Associate Professor, English

FORGNONE, CHARLES J., Ed.D. (George Peabody College)
Professor, Special Education

FORRESTER, DONALD I., Ph.D. (University of California at Berkeley)
Professor, Veterinary Medicine

FOSSUM, JERRY G., Ph.D. (University of Arizona)
Associate Professor, Electrical Engineering

FOSTER, MAELEE T., M.F.A. (Temple University)
Associate Professor, Architecture

FOWLER, EARL C., Ed.D. (Akron State University)
Professor, Instructional Leadership and Support

FOX, JACKSON L., Ph.D. (University of Minnesota)
Assistant Professor, Environmental Engineering Sciences

FOX, WILLIAM M., Ph.D. (Ohio State University)
Professor, Management

FRANCIS, RICHARD L., Ph.D. (Northwestern University)
Professor, Industrial and Systems Engineering

FRANK, JOHN H., Ph.D (Oxford University)
Adjunct Associate Professor, Entomology and Nematology

FRANKLIN, HERBERT, Ed.D. (Indiana University)
Assistant Professor, Educational Administration and Supervision

FRAUMAN, SALLY A., M.S.N. (University of Florida)
Assistant Professor, Nursing

FRAZER, JR., WILLIAM J., Ph.D. (Columbia University)
Professor, Economics

FRAZER, WINIFRED L., Ph.D. (University of Florida)
Professor, English

FRAZIER, CHARLES E., Ph.D. (Southern Illinois University)
Associate Professor, Sociology

FREELAND, JAMES J., J.D. (University of Florida)
Professor, Taxation

FREEMAN, THOMAS E., Ph.D. (Louisiana State University)
Professor, Plant Pathology

FREGLY, MARILYN S., Ph.D. (University of Florida)
Assistant Professor, Journalism and Communications

FREGLY, MELVIN J., Ph.D. (University of Rochester)
Graduate Research Professor, Physiology

FRENCH, WILLIAM J., Ph.D. (Syracuse University)
Associate Professor, Plant Pathology

FREUND, GERHARD, M.D. (Johann Wolfgang Goethe University)
Professor VA, Neuroscience

FRIAS, JAMES L., M.D. (University Concepcion)
Professor, Pediatrics

FRIED, MELVIN, Ph.D. (Yale University)
Professor, Biochemistry and Molecular Biology

FRITZ, GEORGE J., Ph.D. (Purdue University)
Associate Professor, Agronomy

FROMING, WILLIAM J., Ph.D. (University of Texas at Austin)
Assistant Professor, Psychology

FRY, JACK L., Ph.D (Purdue University)
Professor, Animal Science

FUNK, ARTHUR L., Ph.D. (University of Chicago)
Professor, History

FURMAN, THOMAS D., M.S.E. (University of Florida)
Professor, Environmental Engineering Sciences

GAFFNEY, JEROME J., M.S. (Pennsylvania State University)
Assistant Professor, Agricultural Engineering

GAITANIS, LOUIS A., J.D. (University of Florida)
Associate Professor, Finance, Insurance, Real Estate and Urban Land Studies

GAITHER, ROBERT B., Ph.D. (University of Illinois)
Professor, Mechanical Engineering

GALE, STEVEN H., Ph.D. (University of Southern California)
Associate Professor, English

GALLAHER, RAYMOND N., Ph.D. (University of Georgia)
Associate Professor, Agronomy

GANNON, MICHAEL V., Ph.D. (University of Florida)
Professor, History

GANTT, DAVID G., Ph.D. (Washington University)
Assistant Professor, Anthropology

GARCIA, RUBEN V., Ph.D. (University of Texas at Austin)
Assistant Professor, Romance Languages and Literatures

GARG, LAL C., Ph.D (University of Florida)
Associate Professor, Pharmacology and Therapeutics

GARNSEY, STEPHEN M., Ph.D. (University of California at Davis)
Associate Professor, Plant Pathology

GARRARD, LEON A., Ph.D. (University of Florida)
Associate Professor, Agronomy

GARRETT, EDWARD R., Ph.D. (Michigan State University)
Graduate Research Professor, Pharmacy

GARRETT, RICHARD E., Ph.D (University of Virginia)
Professor, Physics and Astronomy

GARRIGUES, ROBERT G., Ph D. (Florida State University)
Assistant Professor, Health and Hospital Administration

GASCHO, GARY J., Ph.D. (Michigan State University)
Professor, Agronomy

GASKIN, JACK M., Ph.D. (Cornell University)
Assistant Professor, Immunology and Medical Microbiology

GASKINS, MURRAY H., Ph.D. (University of Florida)
Professor, Agronomy

GATER, ROGER A., Ph.D. (Purdue University)
Associate Professor, Mechanical Engineering

GATLIN, DOUGLAS S., Ph.D (University of North Carolina)
Professor, Political Science

GAY-CROSIER, RAYMOND, Ph.D. (University of Berne)
Professor, Romance Languages and Literatures

GELATT, KIRK N., V.M.D. (University of Pennsylvania)
Professor, Animal Science

GELLINEK, CHRIS J., Ph.D. (Yale University)
Professor, Germanic and Slavic Languages and Literatures

GEORGE, PAUL S., Ed.D (George Peabody College)
Associate Professor, General Teacher Education

GERBER, JOHN F., Ph.D. (University of Missouri)
Professor, Horticultural Science

GERENCSER, GEORGE A., Ph.D. (Indiana University)
Associate Professor, Physiology

GERHARDT, KENNETH J., Ph.D. (Ohio State University)
Assistant Professor, Speech

GIBBS, EDWARD P., Ph.D. (University of Bristol)
Associate Professor, Immunology and Medical Microbiology

GIESEL, JAMES T., Ph.D. (University of Oregon)
Associate Professor, Zoology

GIFFORD, GEORGE E., Ph.D. (University of Minnesota)
Professor, Immunology and Medical Microbiology

GILBERT, CARTER R., Ph.D. (University of Michigan)
Associate Professor, Zoology

GILES, GEOFFREY J., Ph.D. (University of Cambridge)
Visiting Assistant Professor, History

GILES, MICHAEL W., Ph.D. (University of Kentucky)
Associate Professor, Political Science

GLEIM, IRVIN N., Ph.D. (University of Illinois)
Associate Professor, Accounting

GODDARD, FREDERICK O., Ph.D. (Duke University)
Associate Professor, Economics

GODDARD, RAY E., Ph.D. (Texas A & M University)
Professor, Agronomy

GODSHALK, GORDON L., Ph.D. (Michigan State University)
Visiting Assistant Professor, Botany

GOLDBERG, EUGENE P., Ph.D. (Brown University)
Professor, Materials Science and Engineering

GOLDMAN, JACQUELIN R., Ph.D. (University of Illinois)
Professor, Clinical Psychology

GOLDSTEIN, LEWIS P., Ph.D. (University of Kansas)
Adjunct Assistant Professor, Speech

GOLDSTEIN, MARK K., Ph.D. (Cornell University)
Adjunct Assistant Professor, Psychology

GONZALEZ, GERARDO M., Ph.D. (University of Florida)
Affiliate Assistant Professor, Counselor Education

GOODALE, THOMAS G., Ph.D (Iowa State University)
Associate Professor, Counselor Education

GORBET, DANIEL W., Ph.D. (Oklahoma State University)
Associate Professor, Agronomy

GORDON, JOHN R., Ph.D. (University of Wisconsin)
Associate Professor, Food and Resource Economics

GORDON, RONALD J., Ph.D. (Princeton University)
Professor, Chemical Engineering

GORMAN, BENJAMIN L., Ph.D (Tulane University)
Professor, Sociology

GOSLINGA, CORNELIS C., Ph.D. (Nijmegen University)
Professor, History

GOTTESMAN, STEPHEN T., Ph.D. (University of Manchester)
Associate Professor, Physics and Astronomy

GOULD, ROBERT W., Ph.D (University of Florida)
Professor, Materials Science and Engineering

GRAETZ, DONALD A., Ph.D. (University of Wisconsin)
Associate Professor, Soil Science

GRAMS, R. R., M.D. (University of Minnesota)
Professor, Pathology

GRATER, JR., HARRY A., Ph.D. (Pennsylvania State University)
Professor, Psychology

GREANY, PATRICK D., Ph.D. (University of California at Riverside)
Adjunct Assistant Professor, Entomology and Nematology

GREEN, ALEX E., Ph.D. (University of Cincinnati)
Graduate Research Professor, Astronomy

GREEN, JAMES R., M.D. (University of Virginia)
Professor, Community Health and Family Medicine

GREEN, RICHARD H., Ph.D. (University of California at Berkeley)
Professor, English

GREEN, RICHARD L., Ph.D. (University of Illinois)
Associate Professor, Theatre

GREEN, JR., VICTOR E., Ph.D. (Purdue University)
Professor, Agronomy

GREENE, BARRY R., Ph.D. (St. Louis University)
Associate Professor, Health and Hospital Administration

GREENWOOD, GORDON E., Ed.D. (Indiana University)
Professor, Foundations of Education

GREGG, JAMES H., Ph.D. (Princeton University)
Professor, Microbiology and Cell Science

GREGORY, III, JESSE F., Ph.D. (Michigan State University)
Assistant Professor, Food Science and Human Nutrition

GREGORY, JOHN W., Ph.D. (Ohio State University)
Associate Professor, Subject Specialization Teacher Education

GRIERSON, WILLIAM, Ph.D. (Cornell University)
Professor, Horticultural Science

GRIFFIN, III, DANA G., Ph.D. (University of Tennessee)
Professor, Botany

GRIFFIN, JR., GEORGE M., Ph.D. (Rice University)
Professor, Geology

GRIFFITH, JOHN L., Ed.D. (Oklahoma State University)
Professor, Journalism and Communications

GRIGGS, HARRY H., Ph.D. (University of Iowa)
Professor, Journalism and Communications

GRIGGS, RICHARD A., Ph.D. (Indiana University)
Associate Professor, Psychology

GRINDAL, BRUCE T., Ph.D. (Indiana University)
Associate Professor, Anthropology

GRISSOM, EUGENE E., M.F.A. (University of Iowa)
Professor, Art

GRIZZARD, MICHAEL B., M.D. (University of Michigan)
Assistant Professor, Immunology and Medical Microbiology

GRONWALL, RONALD R., Ph.D. (University of California at Davis)
Professor, Veterinary Medicine

GROSENBAUGH, LEWIS R., M.F. (Yale University)
Adjunct Professor, Food and Resource Economics

GUDAT, JOHN C., Ph.D. (Cornell University)
Associate Professor, Pathology

GUERTIN, WILSON H., Ph.D. (Michigan State University)
Professor, Foundations of Education

GUINAGH, BARRY J., Ph.D. (Michigan State University)
Associate Professor, Foundations of Education

GULL, DWAIN D., Ph.D. (Cornell University)
Associate Professor, Horticultural Science

GUNTER, DANNY L., Ph.D. (University of Tennessee)
Assistant Professor, Food and Resource Economics

GUTKNECHT, BRUCE A., Ed.D. (Wayne State University)
Associate Professor, Instructional Leadership and Support

GUY, ALBERT G., D.Sc. (Carnegie Mellon University)
Professor, Materials Science and Engineering

HAASE, RONALD W., B.Arch. (University of Minnesota)
Associate Professor, Architecture

HABECK, DALE H., Ph.D. (University of North Carolina)
Professor, Entomology and Nematology

HACKETT, RAYMOND L., M.D. (University of Vermont)
Professor, Pathology

HAGSTRUM, DAVID W., Ph.D. (University of Southern California)
Adjunct Assistant Professor, Entomology and Nematology

HAILE, DANEL G., Ph.D. (Texas A & M University)
Assistant Professor, Agricultural Engineering

HALE, JAMES A., Ph.D. (University of Wisconsin)
Associate Professor, Educational Administration and Supervision

HALE, JAMES P., M.S. (University of Illinois)
Professor, Music

HALE, JR., MARK P., Ph.D. (University of Illinois)
Associate Professor, Mathematics

HALL, CHESLEY B., Ph.D. (Cornell University)
Professor, Horticultural Science

HALL, DONALD W., Ph.D. (University of Florida)
Associate Professor, Entomology and Nematology

HALL, JR., EVERETTE E., Ph.D. (University of Florida)
Associate Professor, Psychology

HALLER, WILLIAM T., Ph.D. (University of Florida)
Associate Professor, Agronomy

HALLIWELL, RICHARD E., Ph.D. (University of Cambridge)
Associate Professor, Immunology and Medical Microbiology

HALLMAN, CLEMENS L., Ph.D. (Indiana University)
Associate Professor, Subject Specialization Teacher Education

HALLMARK, CHARLES T., Ph.D. (Ohio State University)
Assistant Professor, Soil Science

HALPERIN, DON A., Ph.D. (Virginia Polytechnic Institute)
Professor, Building Construction

HALSEY, LAWRENCE H., M.S.A. (University of Florida)
Associate Professor, Horticultural Science

HAMACHER, HOWARD B., M.Arch. (University of Kansas)
Professor, Architecture

HAMMER, LOWELL C., Ph.D. (University of Florida)
Professor, Communicative Disorders

HAMMER, RICHARD H., Ph.D. (University of Arizona)
Professor, Medicinal Chemistry

HAMMOND, LUTHER C., Ph.D. (Iowa State University)
Professor, Soil Science

HAMON, AVAS B., Ph.D. (Virginia Polytechnic Institute)
Assistant Professor, Entomology and Nematology

HANNAH, LARKIN C., Ph.D. (University of Wisconsin)
Associate Professor, Horticultural Science

HANRAHAN, ROBERT J., Ph.D. (University of Wisconsin)
Professor, Chemistry

HANSEN, ART, Ph.D. (Cornell University)
Associate Professor, Anthropology

HARBAUGH, BRENT K., Ph.D. (Kansas State University)
Assistant Professor, Horticultural Science

HARDER, JAYNE C., Ph.D. (University of Florida)
Professor, Linguistics

HARDMAN, MARTHA J., Ph.D. (Stanford University)
Professor, Anthropology

HARDY, JOHN W., Ph.D. (Kansas State University)
Professor, Zoology

HARGROVE, DON D., Ph.D. (University of Florida)
Associate Professor, Animal Science

HARING, ELLEN S., Ph.D. (University of Vienna)
Professor, Philosophy

HARMS, ROBERT H., Ph.D. (Texas A & M University)
Professor, Poultry Science

HARRIS, JR., BARNEY, Ph.D. (Oklahoma State University)
Professor, Dairy Science

HARRIS, FAYE G., Ed.D. (University of Florida)
Associate Professor, Nursing

HARRIS, JAMES O., M.D. (University of Mississippi)
Associate Professor, Medicine

HARRIS, LAWRENCE D., Ph.D. (Michigan State University)
Associate Professor, Forest Resources and Conservation

HARRISON, DALTON S., M.S.Ag. (University of Florida)
Professor, Agricultural Engineering

HARRISON, WILLARD L., M.S.P. (University of Florida)
Associate Professor, Pharmacy

HARTIGAN, KARELISA V., Ph.D. (University of Chicago)
Associate Professor, Classics

HARTLEY, CRAIG S., Ph.D. (Ohio State University)
Professor, Materials Science and Engineering

HARVEY, JOHN W., Ph.D. (University of California at Davis)
Associate Professor, Veterinary Medicine

HASS, CHARLES G., Ed.D. (Columbia University)
Professor, Instructional Leadership and Support

HASS, JANE W., Ph.D. (University of South Carolina)
Assistant Professor, Management

HAUSWIRTH, WILLIAM W., Ph.D. (Oregon State University)
Assistant Professor, Immunology and Medical Microbiology

HAWKINS, IRVIN F., M D. (University of Maryland)
Professor, Radiology

HAYNES, RICHARD P., Ph.D. (University of Illinois)
Associate Professor, Philosophy

HAYS, JR., CLIFFORD O., Ph.D. (University of Texas at Austin)
Associate Professor, Civil Engineering

HEAD, HENRY H., Ph.D. (University of Maryland)
Associate Professor, Dairy Science

HEALY, THOMAS C., Ph.D. (University of Maryland)
Associate Professor, Educational Administration and Supervision

HEANEY, JAMES, Ph.D. (Northwestern University)
Professor, Environmental Engineering Sciences

HEARN, DONALD W., Ph.D. (Johns Hopkins University)
Associate Professor, Industrial and Systems Engineering

HEATON, MARIETA B., Ph.D. (University of North Carolina)
Associate Professor, Neuroscience

HEDGES, WILLIAM D., Ed.D. (George Peabody College)
Professor, Instructional Leadership and Support

HEGGESTAD, ARNOLD A., Ph.D. (Michigan State University)
Professor, Economics

HEILMAN, KENNETH M., M.D (University of Virginia)
Professor, Neurology

HEINS, PAUL J., M.S.D. (University of Washington)
Associate Professor, Dentistry

HELLING, JOHN F., Ph.D. (Ohio State University)
Professor, Chemistry

HELLSTROM, WARD, Ph.D. (University of Illinois)
Professor, English

HEMP, GENE W., Ph.D. (University of Minnesota)
Professor, Engineering Sciences

HENCH, LARRY L., Ph.D. (Ohio State University)
Professor, Materials Science and Engineering

HENDERSON, CHARLES A., Ed.D. (University of Florida)
Associate Professor, Subject Specialization Teacher Education

HENNY, RICHARD J., Ph.D. (University of Minnesota)
Assistant Professor, Horticultural Science

HENRETTA, JOHN C., Ph.D. (Harvard University)
Assistant Professor, Sociology

HENRY, G. S., Ph.D. (Yale University)
Assistant Professor, History

HENRY, JAMES A., Ph.D. (University of Kansas)
Assistant Professor, Geography

HENSEL, DALE R., Ph.D. (Rutgers State University)
Professor, Soil Science

HENSEL, JAMES W., Ph.D. (Iowa State University)
Professor, Instructional Leadership and Support

HENTGES, JR., JAMES F., Ph.D. (University of Wisconsin)
Professor, Animal Science

HERNANDEZ, DAVID E., Ed.D. (Florida State University)
Professor, Instructional Leadership and Support

HERZOG, DONALD C., Ph.D. (Louisiana State University)
Assistant Professor, Entomology and Nematology

HETRICK, VIRGINIA R., Ph.D. (University of Washington)
Assistant Professor, Geography

HICKS, DORA A., Ed.D. (University of Texas at Austin)
Professor, Health Education and Safety

HIEBERT, ERNEST, Ph.D. (Purdue University)
Associate Professor, Plant Pathology

HIERS, RICHARD H., Ph.D. (Yale University)
Professor, Religion

HIETT, SHARON L., Ph.D. (University of Florida)
Assistant Professor, Instructional Leadership and Support

HILL, JR., SAMUEL S., Ph.D. (Duke University)
Professor, Religion

HILL-LUBIN, MILDRED A., Ph.D. (University of Illinois)
Associate Professor, English

HILLIARD, MARY E., Ph.D. (University of Florida)
Professor, Nursing

HIMES, JAMES A., Ph.D. (Cornell University)
Professor, Veterinary Medicine

HINSON, KUELL, Ph.D. (University of Wisconsin)
Professor, Agronomy

HIPPLE, THEODORE W., Ph.D. (University of Illinois)
Professor, Subject Specialization Teacher Education

HIRTH, DAVID H., Ph.D. (University of Michigan)
Associate Professor, Forest Resources and Conservation

HO, TING-JUI, Ph.D. (Indiana University)
Associate Professor, Anthropology

HODGSON, THOM J., Ph.D. (University of Michigan)
Professor, Industrial and Systems Engineering

HOFFMANN, EDWARD M., Ph.D. (University of Miami)
Professor, Microbiology and Cell Science

HOFLUND, GAR B., Ph.D. (University of California at Berkeley)
Assistant Professor, Chemical Engineering

HOGEN ESCH, THEO E., Ph.D. (State University of Leiden)
Professor, Chemistry

HOLLAND, HAROLD F., M.S.C.E. (University of Florida)
Associate Professor, Building Construction

HOLLIEN, HARRY F., Ph.D. (University of Iowa)
Professor, Linguistics

HOLLINGER, THOMAS G., Ph.D. (Purdue University)
Assistant Professor, Anatomy

HOLLIS, III, CHARLES A., Ph.D. (State University of New York)
Associate Professor, Forest Resources and Conservation

HOLLOMAN, WILLIAM K., Ph.D. (University of California at Berkeley)
Assistant Professor, Immunology and Medical Microbiology

HOLLOWAY, PAUL H., Ph.D. (Rensselaer Polytechnic Institute)
Associate Professor, Materials Science and Engineering

HOLLY, MARILYN G., Ph.D. (University of Rochester)
Associate Professor, Philosophy

HOLMES, THELMA M., M.P.H. (University of North Carolina)
Associate Professor, Physical Therapy

HOLSTRUM, GARY L., Ph.D. (University of Iowa)
Associate Professor, Accounting

HOLT, JOHN, Ph.D. (Texas A & M University)
Professor, Food and Resource Economics

HOLYOAK, OWEN J., Ph.D. (University of Iowa)
Professor, Professional Physical Education

HOMAN, JR., SIDNEY R., Ph.D. (Harvard University)
Associate Professor, English

HOMER, CARL G., Ph.D. (Cornell University)
Assistant Professor, Health and Hospital Administration

HOOKS, EUGENE J., Ph.D. (University of Missouri)
Associate Professor, Theatre

HOOPER, JR., CHARLES F., Ph.D. (Johns Hopkins University)
Professor, Physics

HOOPER, JR., LEONARD J., Ph.D. (Southern Illinois University)
Professor, Journalism and Communications

HOOVER, JOHN W., M.S.A.E. (Georgia Institute of Technology)
Professor, Engineering Sciences

HORNBERGER, ROBERT H., Ph.D. (University of Iowa)
Assistant Professor, Psychology

HORNER, EARL S., Ph.D. (Cornell University)
Professor, Agronomy

HOROWITZ, ANN R., Ph.D. (Indiana University)
Associate Professor, Economics

HOROWITZ, IRA, Ph.D. (Massachusetts Institute of Technology)
Graduate Research Professor, Management

HORTENSTINE, CHARLES C., Ph.D. (University of Florida)
Professor, Soil Science

HOULDEN, PAULINE J., Ph.D. (University of North Carolina)
Assistant Professor, Psychology

HOWARD, WILLIAM M., Ph.D. (University of Wisconsin)
Professor, Finance and Insurance

HOWER, ALFRED, Ph.D. (Harvard University)
Professor, Romance Languages and Literatures

HREN, JOHN J., Ph.D. (Stanford University)
Professor, Materials Science and Engineering

HSIEH, CHUNG K., Ph.D. (Purdue University)
Professor, Mechanical Engineering

HSU, CHEN-CHI, Ph.D. (University of Michigan)
Associate Professor, Engineering Sciences

HUBBELL, DAVID H., Ph.D. (University of North Carolina)
Professor, Soil Science

HUBER, WAYNE C., Ph.D. (Massachusetts Institute of Technology)
Professor, Environmental Engineering Sciences

HUCKSHORN, ROBERT J., Ph.D. (State University of Iowa)
Professor, Political Science

HUETTEL, MILTON D., Ph.D. (University of Texas at Austin)
Adjunct Assistant Professor, Entomology and Nematology

HUFFMAN, JACOB B., D.F. (Duke University)
Associate Professor, Forest Resources and Conservation

HUMMEL, R. E., Ph.D. (Max Planck Institute)
Professor, Materials and Science Engineering

HUMPHREY, STEPHEN R., Ph.D. (Oklahoma State University)
Associate Professor, Zoology

HUMPHREYS, THOMAS E., Ph.D. (University of Pennsylvania)
Professor, Botany

HUNTER, JAMES H., Ph.D. (University of California at Los Angeles)
Professor, Astronomy

HYDE, DALLAS M., Ph.D. (University of California at Davis)
Assistant Professor, Veterinary Medicine

HYNES, MICHAEL C., Ph.D. (Kent State University)
Associate Professor, General Teacher Education

IBARRA, FERNANDO, Ph.D. (University of California at Los Angeles)
Associate Professor, Romance Languages and Literatures

IHAS, GARY G., Ph.D. (University of Michigan)
Assistant Professor, Physics

INGLEY, III, HERBERT A., Ph.D. (University of Florida)
Assistant Professor, Mechanical Engineering

INGRAM, DEWAYNE L., Ph.D. (University of Tennessee)
Assistant Professor, Horticultural Science

INGRAM, LONNIE O., Ph.D. (University of Texas at Austin)
Associate Professor, Microbiology and Cell Science

IREY, RICHARD K., Ph.D. (Purdue University)
Professor, Mechanical Engineering

ISENBERG, SHELDON R., Ph.D. (Harvard University)
Associate Professor, Religion

ISMAIL, MOHAMED A., Ph.D. (University of Florida)
Adjunct Associate Professor, Horticultural Science

IVES, JOHN E., M.S. (Yale University)
Affiliate Professor, Health and Hospital Administration

JACKSON, ERIC, Ph.D. (University of Pittsburgh)
Assistant Professor, Dentistry

JACKSON, LARRY K., Ph.D. (University of Florida)
Associate Professor, Horticultural Science

JACKSON, LELAND F., Ph.D. (University of California at Davis)
Assistant Professor, Plant Pathology

JACOBS, ARTHUR J., Ed.D. (Columbia University)
Associate Professor, Journalism and Communications

JACOBSEN, DAVID A., Ed.D. (Arizona State University)
Professor, Instructional Leadership and Support

JAEGER, MARC, M.D. (University of Berne)
Professor, Physiology

JAMES, JOHN H., D.B.A. (Indiana University)
Associate Professor, Management

JANKY, DOUGLAS M., Ph.D. (University of Nebraska)
Associate Professor, Poultry Science

JAROSZEWICZ, MARK T., M.A.U.D. (Swiss Federal Institute of Technology)
Professor, Architecture

JENSEN, PAUL J., Ph.D. (University of Iowa)
Professor, Speech

JESTER, ROBERT E., Ph.D. (University of Utah)
Associate Professor, Foundations of Education

JILEK, ANTHONY F., Ph.D. (University of Florida)
Assistant Professor, Animal Science

JOHNS, JR., LEWIS E., Ph.D. (Carnegie Mellon University)
Associate Professor, Chemical Engineering

JOHNSON, CARL H., Ph.D. (University of Washington)
Associate Professor, Medicinal Chemistry

JOHNSON, CHARLES R., Ph.D. (Oregon State University)
Associate Professor, Horticultural Science

JOHNSON, II, FRED C., Ph.D. (University of Texas at Austin)
Professor, Zoology

JOHNSON, FREDDIE A., Ph.D. (University of Florida)
Associate Professor, Entomology and Nematology

JOHNSON, JAMES T., Ph.D. (Virginia Polytechnic Institute)
Associate Professor, Agronomy

JOHNSON, JR., RAYMOND C., M.S. (University of Florida)
Professor, Electrical Engineering

JOHNSON, ROBERT W., M.S. (Michigan State University)
Associate Professor, Soil Science

JOHNSON, SIMON O., Ed.D. (Indiana University)
Associate Professor, General Teacher Education

JOHNSON, SUSAN M., Ph.D. (University of Texas at Austin)
Assistant Professor, Pharmacy

JOHNSON, SUZANNE B., Ph.D. (State University of New York at Stonybrook)
Assistant Professor, Clinical Psychology

JOHNSTON, DAVID W., Ph.D. (University of California at Berkeley)
Professor, Zoology

JOHNSTON, JAMES M., Ph.D. (University of Florida)
Associate Professor, Psychology

JOHNSTON, OTTO W., Ph.D. (Princeton University)
Associate Professor, Germanic and Slavic Languages and Literatures

JOINER, JAMES, Ph.D. (University of Alabama)
Associate Professor, Rehabilitation Counseling

JOINER, JASPER N., Ph.D. (Ohio State University)
Professor, Horticultural Science

JONES, JAMES W., Ph.D. (University of North Carolina)
Associate Professor, Agricultural Engineering

JONES, JOHN P., Ph.D. (Ohio State University)
Professor, Plant Pathology

JONES, WILLIAM M., Ph.D. (University of Southern California)
Professor, Chemistry

JULIUS, RICHARD L., M.D. (University of Florida)
Assistant Professor, Pediatrics

KAHRS, ROBERT F., Ph.D. (Cornell University)
Professor, Veterinary Medicine

KALLENBACH, ERNST A. T. A., Ph.D (McGill University)
Associate Professor, Anatomy

KALLMAN, ROBERT R., Ph.D. (Massachusetts Institute of Technology)
Professor, Mathematics

KALMAN, RUDOLF E., D.Sci. (Columbia University)
Graduate Research Professor, Electrical Engineering

KALMBACHER, ROBERT S., Ph.D. (Pennsylvania State University)
Assistant Professor, Agronomy

KALRA, SATYA P., Ph.D. (University of Delhi)
Associate Professor, Obstetrics and Gynecology

KANTOWSKI, ELENORE L., Ed.D. (University of Georgia)
Associate Professor, Subject Specialization Teacher Education

KARLAN, MARC S., M.D. (University of Pennsylvania)
Associate Professor, Speech

KARP, GERALD C., Ph.D. (University of Washington)
Associate Professor, Microbiology and Cell Science

KAUFMANN, DAVID A., Ph.D. (University of Iowa)
Associate Professor, Professional Physical Education

KAUFMANN, JOHN H., Ph.D. (University of California at Berkeley)
Professor, Zoology

KAVANAUGH, RAPHAEL R., Ed.D. (Temple University)
Assistant Professor, Counselor Education

KEESLING, JAMES E., Ph.D. (University of Miami)
Professor, Mathematics

KEIG, NORMAN G., Ph.D. (Ohio State University)
Associate Professor, Economics

KEISTER, ELWOOD J., Ed.D. (Columbia University)
Professor, Music

KELSO, WILLIAM A., Ph.D. (University of Wisconsin)
Associate Professor, Political Science

KEM, WILLIAM R., Ph.D. (University of Illinois)
Associate Professor, Pharmacology and Therapeutics

KEMKER, FRANCIS J., Ph.D. (University of Denver)
Associate Professor, Speech

KEMP, HAROLD W., M.S. (University of Illinois)
Associate Professor, Architecture

KENDALL, ROBERT L., Ph.D. (Indiana University)
Associate Professor, Journalism and Communications

KENNEDY, WILLIAM J., Ph.D. (Tulane University)
Assistant Professor, Anthropology

KENNY, LAWRENCE W., Ph.D. (University of Chicago)
Assistant Professor, Economics

KENT, KURT E., Ph.D. (University of Minnesota)
Professor, Journalism and Communications

KEPNER, KARL W., Ph.D (Ohio State University)
Professor, Food and Resource Economics

KERR, STRATTON H., Ph.D (Cornell University)
Professor, Entomology and Nematology

KERSHNER, JR, R. B., Ph.D. (Stanford University)
Associate Professor, English

KERSLAKE, KENNETH A., M.F.A. (University of Illinois)
Professor, Art

KESTERSON, JAMES W., M.S. (Virginia Polytechnic Institute)
Professor, Food Science and Human Nutrition

KHURI, ANDRE I., Ph.D (Virginia Polytechnic Institute)
Assistant Professor, Statistics

KIDDER, GERALD, Ph.D (Oklahoma State University)
Assistant Professor, Agronomy

KIKER, CLYDE F., Ph.D (University of Florida)
Associate Professor, Food and Resource Economics

KILMER, RICHARD L., Ph.D (Ohio State University)
Assistant Professor, Food and Resource Economics

KILPATRICK, KERRY E., Ph.D (University of Michigan)
Professor, Industrial and Systems Engineering

KIMBALL, SOLON T., Ph.D (Harvard University)
Graduate Research Professor, Anthropology

KIMBROUGH, JAMES W., Ph.D (Cornell University)
Professor, Botany

KIMBROUGH, RALPH B., Ed.D (University of Tennessee)
Professor, Educational Administration and Supervision

KING, ARTHUR D., Ph.D (Florida State University)
Associate Professor, Instructional Leadership and Support

KING, F. W., Ph.D. (University of Miami)
Professor, Zoology

KING, ROBERT L., Ph.D (Johns Hopkins University)
Associate Professor, Neuroscience

KINZER, SUZANNE M., Ed.D (University of Rochester)
Associate Professor, General Teacher Education

KINZEY, JR., BERTRAM Y., M.S. (Virginia Polytechnic Institute)
Professor, Architecture

KIRK, JAMES R., Ph.D (Michigan State University)
Professor, Food Science and Human Nutrition

KIRKPATRICK, MARTIN S., M.A. (University of Florida)
Professor, English

KIRMSE, DALE W., Ph.D (Iowa State University)
Associate Professor, Chemical Engineering

KITTS, JOHN S., M.M (Butler University)
Professor, Music

KLEIN, PAUL A., Ph.D (University of Florida)
Associate Professor, Pathology

KNAUFT, DAVID A., Ph.D (Cornell University)
Assistant Professor, Agronomy

KNAUSS, JAMES F., Ph.D (Cornell University)
Professor, Plant Pathology

KNIGHT, JR., ROBERT J., Ph.D. (University of Virginia)
Adjunct Professor, Horticultural Science

KNISELEY, SHERMAN P., Ph.D (University of North Carolina)
Professor, Music

KNOWLES, LOIS N., Ph.D (Lawrence University)
Professor, Nursing

KOBURGER, JOHN A., Ph.D (University of North Carolina)
Professor, Food Science and Human Nutrition

KOEHLER, GARY J., Ph.D (Purdue University)
Associate Professor, Management

KOEHLER, PHILIP G., Ph.D (Cornell University)
Associate Professor, Entomology and Nematology

KOGER, MARVIN, Ph.D (University of Missouri)
Professor, Animal Science

KOLARIK, JOSEPH M., Ph.D (University of Pittsburgh)
Professor, Psychology

KOO, ROBERT C., Ph.D (University of Florida)
Professor, Horticultural Science

KORAN, JR., JOHN J., Ph.D (Stanford University)
Professor, Subject Specialization Teacher Education

KORAN, MARY L., Ph.D (Stanford University)
Professor, Foundations of Education

KOSTEWICZ, STEPHEN R., Ph.D (Ohio State University)
Associate Professor, Horticultural Science

KOTEY, PAUL A., Ph.D (University of Wisconsin)
Associate Professor, Linguistics

KRAFT, HELGA W., Ph.D (University of California at Berkeley)
Associate Professor, Germanic and Slavic Languages and Literatures

KRAMER, SOL P., Ph.D (University of Illinois)
Professor, Anthropology

KREICHER, LAWRENCE L., Ph.D (Harvard University)
Assistant Professor, Economics

KRETSCHMER, JR., ALBERT E., Ph.D (Rutgers State University)
Professor, Agronomy

KRISCHER, JEFFREY P., Ph.D (Harvard University)
Associate Professor, Industrial and Systems Engineering

KUCHAREK, THOMAS A., Ph.D (University of Minnesota)
Associate Professor, Plant Pathology

KUHNHENN, GARY L., Ph.D (University of Illinois)
Assistant Professor, Geology

KULDAU, JOHN M., M.D. (Western Reserve University)
Associate Professor, Psychiatry

KURZWEG, ULRICH H., Ph.D (Princeton University)
Professor, Engineering Sciences

KUSHNER, DAVID Z., Ph.D (University of Michigan)
Professor, Music

KYSILKA, MARCELLA L., Ph.D. (University of Texas at Austin)
Professor, Instructional Leadership and Support

LA GRECA, ANTHONY J., Ph.D. (Ohio State University)
Associate Professor, Sociology

LA POINTE, LEONARD L., Ph.D. (University of Colorado)
Assistant Professor, Speech

LABISKY, RONALD F., Ph.D. (University of Wisconsin)
Professor, Forest Resources and Conservation

LABREQUE, GERMAINE C., Ph.D. (Ohio State University)
Professor, Entomology and Nematology

LAIPIS, PHILIP J., Ph.D. (Stanford University)
Assistant Professor, Biochemistry and Molecular Biology

LAITINEN, HERBERT A., Ph.D. (University of Minnesota)
Graduate Research Professor, Chemistry

LAMBORN, BJORN, Ph.D. (University of Florida)
Associate Professor, Physics

LAMME, III, ARY J., Ph.D. (Syracuse University)
Associate Professor, Geography

LAMME, LINDA L., Ph.D. (Syracuse University)
Associate Professor, General Teacher Education

LANCIANI, CARMINE A., Ph.D. (Cornell University)
Associate Professor, Zoology

LANDSMAN, THEODORE, Ph.D. (Syracuse University)
Professor, Counselor Education

LANE, DAVID, Ph.D. (Columbia University)
Adjunct Professor, Counselor Education

LANGHAM, MAX R., Ph.D. (University of Illinois)
Professor, Food and Resource Economics

LANZILLOTTI, ROBERT F., Ph.D. (University of California at Berkeley)
Professor, Economics

LARKIN, LYNN H., Ph.D. (University of Colorado)
Professor, Anatomy

LARSEN, JANET J., Ed.D. (University of Florida)
Associate Professor, Counselor Education

LARSON, JEAN A., Ph.D. (Dartmouth College)
Associate Professor, Mathematics

LASLEY, MARION M., Ph.D. (Columbia University)
Associate Professor, Romance Languages and Literatures

LATHAM, JAMES P., Ph.D. (University of Pennsylvania)
Professor, Geography

LATOUR, MARINUS H., M.S.E. (University of Florida)
Associate Professor, Electrical Engineering

LATOUR, STEPHEN A., Ph.D. (University of North Carolina)
Assistant Professor, Marketing

LAWLESS, ROBERT, Ph.D. (New School of Social Research)
Associate Professor, Anthropology

LAWRENCE, GORDON D., Ph.D. (Claremont Graduate School)
Associate Professor, Instructional Leadership and Support

LAWRENCE, PAULINE O., Ph.D. (University of Florida)
Assistant Professor, Zoology

LE GRAND, FERDINAND, M.S. (College for Sugar Chemistry and Technology)
Associate Professor, Agronomy

LEADON, BERNARD M., Ph.D. (University of Minnesota)
Professor, Engineering Sciences

LEAVENWORTH, RICHARD S., Ph.D. (Stanford University)
Professor, Industrial and Systems Engineering

LEAVITT, NORMA M., Ed.D. (Columbia University)
Professor, Professional Physical Education

LEBO, GEORGE R., Ph.D. (University of Florida)
Associate Professor, Physics and Astronomy

LEE, CHING-SAN C., Ph.D. (University of California at Berkeley)
Assistant Professor, Pharmacy

LEE, DAVID R., Ph.D. (University of California at Los Angeles)
Assistant Professor, Geography

LEE, HONG H., Ph.D. (Purdue University)
Assistant Professor, Chemical Engineering

LEE, JONG-YING, Ph.D. (University of Florida)
Adjunct Assistant Professor, Food and Resource Economics

LEGG, KEITH R., Ph.D. (University of California at Berkeley)
Professor, Political Science

LEIBMAN, KENNETH C., Ph.D. (New York University)
Professor, Pharmacology and Therapeutics

LEMARCHAND, RENE, Ph.D. (University of California at Los Angeles)
Professor, Political Science

LEMBERGER, MAX A., M.S. (University of Wisconsin)
Associate Professor, Pharmacy

LEONARD, CHRISTIANA M., Ph.D. (Massachusetts Institute of Technology)
Associate Professor, Neuroscience

LEPPLA, NORMAN C., Ph.D. (University of Arizona)
Assistant Professor, Entomology and Nematology

LERCH, HAROLD A., Ph.D. (Ohio State University)
Professor, Professional Physical Education

LESLIE, GERALD R., Ph.D. (Ohio State University)
Professor, Sociology

LEVY, JR., CHARLES M., Ph.D. (University of Wisconsin)
Professor, Psychology

LEWIS, JR., ALLISON L., Ph.D. (Duke University)
Professor, Philosophy

LEWIS, ARTHUR J., Ed.D. (Columbia University)
Professor, Instructional Leadership and Support

LI, SHENG S., Ph.D. (Rice University)
Professor, Electrical Engineering

LIEB, SANDI, Ph.D. (University of Kentucky)
Associate Professor, Animal Science

LIEBERMAN, LESLIE S., Ph.D. (University of Connecticut)
Assistant Professor, Anthropology

LINCOLN, EDWARD P., Ph.D. (University of Arizona)
Assistant Professor, Agricultural Engineering

LIND, STEPHEN A., LL.M. (New York University)
Professor, Taxation

LINDGREN, ERIK R., Dr.Sc. (Royal Institute of Technology)
Professor, Engineering Sciences

LINDHOLM, FRED A., Ph.D. (University of Arizona)
Professor, Electrical Engineering

LIPSEY, RICHARD L., Ph.D. (University of Illinois)
Associate Professor, Entomology and Nematology

LISCA, PETER, Ph.D. (University of Wisconsin)
Professor, English

LISLE, JR., FORREST F., M.Arch. (Cornell University)
Associate Professor, Architecture

LITTELL, RAMON C., Ph.D. (Oklahoma State University)
Associate Professor, Statistics

LLORENS, LELA A., Ph.D. (Walder University)
Professor, Occupational Therapy

LLOYD, JAMES E., Ph.D. (Cornell University)
Professor, Entomology and Nematology

LOCASCIO, SALVADORE J., Ph.D. (Purdue University)
Professor, Horticultural Science

LOCKE, DAVID M., Ph.D. (University of Illinois)
Assistant Professor, English

LOCKHART, MADELYN M., Ph.D. (Ohio State University)
Professor, Economics

LOESCH, LARRY C., Ph.D. (Kent State University)
Associate Professor, Counselor Education

LOFGREN, CLIFFORD S., Ph.D. (University of Florida)
Professor, Entomology and Nematology

LOGGINS, P. E., M.S. (Oklahoma State University)
Professor, Animal Science

LOMBANA, JUDY H., Ph.D. (Florida State University)
Associate Professor, Counselor Education

LOMBARDINO, LINDA J., Ph.D. (Ohio State University)
Assistant Professor, Speech

LOMBARDO, ANTHONY, Ph.D. (Syracuse University)
Assistant Professor, Chemistry

LONG, GARY, Ph.D. (Texas A & M University)
Associate Professor, Civil Engineeting

LONG, ROBERT L., Ph.D. (University of Illinois)
Assistant Professor, Mathematics

LONGSTRETH, JAMES W., Ed.D. (University of Florida)
Associate Professor, Educational Administration and Supervision

LOSANO, WAYNE A., Ph.D. (Rensselaer Polytechnic Institute)
Associate Professor, English

LOTZKAR, STANLEY, M.P.H. (University of Pittsburgh)
Professor, Dentistry

LOUVIERE, JORDAN J., Ph.D. (University of Iowa)
Assistant Professor, Geography

LOWDIN, PER-OLOV, Ph.D. (Uppsala University)
Graduate Research Professor, Chemistry

LOWE, RONALD E., Ph.D. (Purdue University)
Assistant Professor, Entomology and Nematology

LOWENSTEIN, RALPH L., Ph.D. (University of Missouri)
Professor, Journalism and Communications

LU, SUNG Y., Ph.D. (Carnegie Mellon Institute)
Associate Professor, Engineering Sciences

LUCANSKY, TERRY W., Ph.D. (Duke University)
Associate Professor, Botany

LUEHR, CHARLES P., Ph.D. (University of California at Berkeley)
Associate Professor, Mathematics

LUGO, ARIEL, Ph.D. (University of North Carolina)
Associate Professor, Botany

LUKE, HERBERT H., Ph.D. (Louisiana State University)
Professor, Plant Pathology

LUNDEEN, HARRY C., D.D.S. (University of Minnesota)
Professor, Dentistry

LUNDGREN, DALE A., Ph.D. (University of Minnesota)
Professor, Environmental Engineering Sciences

LUTRICK, MONROE C., Ph.D. (Ohio State University)
Professor, Soil Science

LUTTGE, WILLIAM G., Ph.D. (University of California at Irvine)
Associate Professor, Neuroscience

LYBAS, JOHN M., Ph.D. (University of Illinois)
Assistant Professor, Civil Engineering

LYNCH, ANN Q., Ed.D. (University of Florida)
Assistant Professor, Counselor Education

LYNCH, MICHEL A., Ph.D. (University of Florida)
Associate Professor, Astronomy

LYNNE, GARY D., Ph.D. (Oregon State University)
Associate Professor, Food and Resource Economics

LYRENE, PAUL M., Ph.D. (University of Wisconsin)
Associate Professor, Horticultural Science

MACAULAY, JR., NEILL W., Ph.D. (University of Texas at Austin)
Professor, History

MACDONALD, WILLIAM D., S.J.D. (University of Michigan)
Professor, Latin American Studies

MACE, JR., ARNETT C., Ph.D. (University of Arizona)
Professor, Forest Resources and Conservation

MACFADDEN, BRUCE J., Ph.D. (Columbia University)
Assistant Professor, Zoology

MACKENZIE, RICHARD S., Ph.D. (University of Pittsburgh)
Professor, Instructional Leadership and Support

MACLAREN, NOEL K., M.D. (Otago University)
Professor, Pathology

MACQUIGG, DAVID R., Ph.D. (California Institute of Technology)
Assistant Professor, Electrical Engineering

MADDALA, G. S., Ph.D. (University of Chicago)
Graduate Research Professor, Economics

MAGGIOTTO, MICHAEL A., Ph.D. (Indiana University)
Assistant Professor, Political Science

MAGNARELLA, PAUL J., Ph.D. (Harvard University)
Professor, Anthropology

MAHAN, CHARLES S., M.D. (Northwestern University)
Associate Professor, Obstetrics and Gynecology

MAHAN, PARKER E., Ph.D. (University of Rochester)
Professor, Dentistry

MAHIG, JOSEPH, Ph.D (Ohio State University)
Professor, Mechanical Engineering

MAHON, JOHN K., Ph.D. (University of California at Los Angeles)
Professor, History

MAHONEY, JOHN F., Ph.D. (Lehigh University)
Associate Professor, Industrial and Systems Engineering

MAINO, VERNON C., Ph.D. (University of Rochester)
Assistant Professor, Pathology

MAJTHAY, ANTAL, Ph.D. (University of Szeged)
Associate Professor, Management

MALAGODI, JR., EDWARD F., Ph.D. (University of Miami)
Associate Professor, Psychology

MALO, SIMON E., Ph.D. (University of Florida)
Professor, Horticultural Science

MALVERN, LAWRENCE E., Ph.D. (Brown University)
Professor, Engineering Sciences

MALVERN, MARJORIE M., Ph.D. (Michigan State University)
Associate Professor, English

MANASTER, STEVEN, Ph D (University of Chicago)
Assistant Professor, Finance, Insurance, Real Estate, and Urban Land Studies

MANER, JEROME H., Ph.D. (Cornell University)
Professor, Animal Science

MANS, RUSTY J., Ph.D. (University of Florida)
Professor, Biochemistry and Molecular Biology

MANSELL, ROBERT S., Ph.D. (Iowa State University)
Professor, Soil Science

MANSHEIM, BERNARD J., M.D. (University of Wisconsin)
Assistant Professor, Immunology and Medical Microbiology

MAPLES, WILLIAM R., Ph.D. (University of Texas at Austin)
Associate Professor, Anthropology

MARCUS, ROBERT B., Ed.D. (University of Florida)
Professor, Geography

MAREN, THOMAS H., M.D. (Johns Hopkins University)
Graduate Research Professor, Pharmacology and Therapeutics

MARGOLIS, MAXINE L., Ph.D. (Columbia University)
Associate Professor, Anthropology

MARION, WAYNE R., Ph.D. (Texas A & M University)
Assistant Professor, Forest Resources and Conservation

MARKEL, NORMAN N., Ph.D. (University of Chicago)
Professor, Speech

MARKS, RONALD G., Ph.D. (University of Florida)
Assistant Professor, Statistics

MARLOWE, JR., GEORGE A., Ph.D. (University of Maryland)
Professor, Horticultural Science

MARSHALL, SIDNEY P., Ph.D. (University of Minnesota)
Professor, Dairy Science

MARTIN, FRANK G., Ph.D. (University of North Carolina)
Associate Professor, Statistics

MARTINEZ, JORGE, Ph.D. (Tulane University)
Associate Professor, Mathematics

MARVEL, MASON E., Ph.D. (West Virginia University)
Professor, Horticultural Science

MATHENY, JR., ELLIS L., Ph.D. (University of Tennessee)
Assistant Professor, Entomology and Nematology

MATHIS, KARY, Ph.D. (Texas A & M University)
Professor, Food and Resource Economics

MATTHEWS, CHARLES A., Ph.D. (University of Virginia)
Professor, Finance and Insurance

MATTHEWS, RICHARD F., Ph.D. (Cornell University)
Professor, Food Science and Human Nutrition

MATURO, JR., FRANK J., Ph.D. (Duke University)
Professor, Zoology

MAUDERLI, WALTER, D.Sc. (University of Zurich)
Professor, Environmental Engineering Sciences

MAUTZ, ROBERT B., LL.B. (Yale University)
Professor, Educational Administration and Supervision

MAY, FRANK P., Ph.D. (University of Florida)
Professor, Chemical Engineering

MAYER, MARION S., Ph.D. (Texas A & M University)
Adjunct Associate Professor, Entomology and Nematology

MCALISTER, LYLE N., Ph.D. (University of California at Berkeley)
Distinguished Service Professor, History

MCASHAN, HILDRETH H., Ph.D. (Michigan State University)
Professor, Educational Administration and Supervision

MCCARTHY, KEVIN M., Ph.D. (University of North Carolina)
Associate Professor, English

MCCAULLEY, MARY H., Ph.D. (Temple University)
Assistant Professor, Clinical Psychology

MCCLAVE, JAMES T., Ph.D. (University of Florida)
Associate Professor, Statistics

MCCLOUD, DARELL E., Ph.D. (Purdue University)
Professor, Agronomy

MCCOLLOUGH, WILLIAM A., Ph.D. (University of Florida)
Associate Professor, Finance and Insurance

MCCONNELL, DENNIS B., Ph.D. (University of Wisconsin)
Associate Professor, Horticultural Science

MCCONNELL, HAROLD, Ph.D. (University of Iowa)
Professor, Geography

MCCORMICK, WILLIAM C., Ph.D. (University of Wisconsin)
Associate Professor, Pharmacy

MCCOY, JR., CLAYTON W., Ph.D. (University of California at Los Angeles)
Professor, Entomology and Nematology

MCCOY, RANDOLPH E., Ph.D (Cornell University)
Associate Professor, Plant Pathology

MCCOY, TERRY L., Ph.D. (University of Wisconsin)
Associate Professor, Latin American Studies

MCCREA, BRIAN R., Ph.D. (University of Virginia)
Assistant Professor, English

MCDAVIS, RODERICK, Ph.D. (University of Toledo)
Associate Professor, Counselor Education

MCDONALD, CHARLES L., Ph.D. (Michigan State University)
Associate Professor, Accounting

MCDOWELL, LEE, Ph.D. (Washington State University)
Associate Professor, Animal Science

MCGHEE, MAXIE B., Ph.D. (Ohio State University)
Assistant Professor, Agricultural and Extension Education

MCGUIGAN, JAMES E., M.D. (St. Louis University)
Professor, Immunology and Medical Microbiology

MCGUIRE, JAMES B., Ph.D. (University of California at Los Angeles)
Associate Professor, Physics

MCGUIRE, PETER M., Ph.D. (University of North Carolina)
Assistant Professor, Biochemistry and Molecular Biology

MCGUIRE, VINCENT, Ed.D. (University of Florida)
Professor, Subject Specialization Teacher Education

MCKENZIE, MICHAEL W., M.S. (University of Florida)
Associate Professor, Pharmacy

MCKNIGHT, STEPHEN A., Ph.D. (Emory University)
Associate Professor, Philosophy

MCLAUGHLIN, JOHN R., Ph.D. (University of California at Berkeley)
Assistant Professor, Entomology and Nematology

MCMILLAN, JR., ROBERT T., Ph.D. (Washington State University)
Associate Professor, Plant Pathology

MCMILLIN, MARVIN R., Ed.D. (University of Florida)
Associate Professor, Counselor Education

MCNAB, BRIAN K., Ph.D. (University of Wisconsin)
Professor, Zoology

MCPHERSON, WOODROW W., Ph.D (Harvard University)
Graduate Research Professor, Food and Resource Economics

MCQUOWN, OMEGA R., Ph.D (University of Florida)
Professor, Political Science

MCRAE, JOHN M., M.Arch. (Rice University)
Associate Professor, Architecture

MEALIA, JR., WALLACE L., Ph.D. (University of Missouri)
Professor, Clinical Psychology

MEEK, PHYLLIS M., Ed.D (University of Florida)
Affiliate Associate Professor, Counselor Education

MEHTA, ASHISH J., Ph.D. (University of Florida)
Assistant Professor, Coastal Engineering

MELAMED, BARBARA G., Ph.D. (University of Wisconsin)
Professor, Clinical Psychology

MELTON, BRYAN E., Ph.D. (Iowa State University)
Assistant Professor, Food and Resource Economics

MELVILLE, JOEL G., Ph.D. (Pennsylvania State University)
Assistant Professor, Civil Engineering

MENDENHALL, III, WILLIAM, Ph.D. (University of North Carolina)
Professor, Statistics

MERCER, CECIL D., Ed.D (University of Virginia)
Associate Professor, Special Education

MERRITT, JR., HARRY C., M.S. (Harvard University)
Professor, Architecture

MERWIN, WILLIAM C., Ph.D. (University of Georgia)
Professor, Instructional Leadership and Support

MESCH, BARRY, Ph.D. (Brandeis University)
Associate Professor, Religion

MESSER, JAY J., Ph.D. (University of Florida)
Adjunct Instructor, Environmental Engineering Sciences

METCALF, JOSEPH F., Ph.D. (Florida State University)
Assistant Professor, Physiology

METZ, WILLIAM W., D.B.A. (George Washington University)
Adjunct Lecturer, Industrial and Systems Engineering

MEYER, MERLE E., Ph.D. (University of Washington)
Professor, Psychology

MICHA, DAVID A., Ph.D. (Uppsala University)
Professor, Chemistry

MILANICH, JERALD T., Ph.D. (University of Florida)
Associate Professor, Anthropology

MILES, RICHARD D., Ph.D. (Purdue University)
Assistant Professor, Poultry Science

MILLER, CLEVE D., LL.M (New York University)
Professor, Taxation

MILLER, D. G., Ph.D. (Harvard University)
Associate Professor, Linguistics

MILLER, JOHN W., Ph.D. (University of Florida)
Associate Professor, Plant Pathology

MILLER, SCOTT A., Ph.D (University of Minnesota)
Associate Professor, Psychology

MILLER, WILLIAM M., Ph.D. (Pennsylvania State University)
Assistant Professor, Agricultural Engineering

MILLIMAN, JEROME W., Ph.D. (University of California at Los Angeles)
Professor, Economics

MILLION, RODNEY R., M.D. (Indiana University)
Professor, Radiology

MILLSAPS, KNOX T., Ph.D. (California Institute of Technology)
Professor, Engineering Sciences

MILON, JOSEPH W., Ph.D. (Florida State University)
Assistant Professor, Food and Resource Economics

MILTON, GEORGE M., M.F.A. (Florida State University)
Assistant Professor, Anthropology

MILTON, JAMES E., Ph.D. (University of Florida)
Engineer, Engineering Sciences

MINNICK, DANNY R., Ph.D. (University of Florida)
Associate Professor, Entomology and Nematology

MISHOE, J. WAYNE, Ph.D. (University of North Carolina)
Associate Professor, Agricultural Engineering

MISLEVY, PAUL, Ph.D. (Pennsylvania State University)
Associate Professor, Agronomy

MITCHELL, DAVID J., Ph.D. (University of California at Berkeley)
Associate Professor, Plant Pathology

MITCHELL, EVERETT R., Ph.D. (University of North Carolina)
Associate Professor, Entomology and Nematology

MOHAMMED, HAMDI A., Ph.D (University of Michigan)
Professor, Materials Science and Engineering

MONKHORST, HENDRIK J., Ph.D. (University of Groningen)
Associate Professor, Physics

MONTELARO, JAMES , Ph.D. (University of Florida)
Professor, Horticultural Science

MOODY, LINDA E., Ph.D. (University of Florida)
Assistant Professor, Professional Physical Education

MOORE, CLARENCE A., Ph.D. (University of Alabama)
Professor, Professional Physical Education

MOORE, GEORGE P., Ph.D. (Northwestern University)
Distinguished Service Professor, Speech

MOORE, JOHN E., Ph.D. (Ohio State University)
Professor, Animal Science

MOORE, THERAL O., Ph.D. (University of Missouri)
Associate Professor, Mathematics

MOORE, WILLIAM H., M.S. (Auburn University)
Adjunct Assistant Professor, Forest Resources and Conservation

MORELAND, ALVIN F., D.V.M. (University of Georgia)
Professor, Medicine

MORGAN, CHARLES F., M.Arch. (University of California at Los Angeles)
Assistant Professor, Architecture

MORGAN, JAMES I., Ed.D (University of Florida)
Associate Professor, Psychology

MORGAN, MARGARET K., Ph.D. (University of Kentucky)
Associate Professor, Instructional Leadership and Support

MORGAN, PHILLIP B., Ph.D. (Kansas State University)
Professor, Entomology and Nematology

MORGAN, WILLIAM H., Ph.D. (University of Florida)
Associate Professor, Geography

MORRISON, JAMES F., Ph.D. (Stanford University)
Associate Professor, Political Science

MOSCOVOCI, CARLOS, Ph.D. (University of Rome)
Professor, Pathology

MOTT, GERALD O., Ph.D. (Cornell University)
Professor, Agronomy

MOYE, HUGH A., Ph.D. (University of Florida)
Professor, Food Science and Human Nutrition

MUELLER, PAUL A., Ph.D. (Rice University)
Associate Professor, Geology

MUGA, MARVIN L., Ph.D. (University of Texas at Austin)
Professor, Chemistry

MULKEY, WILLIAM D., Ph.D. (Clemson University)
Assistant Professor, Food and Resource Economics

MULLALLY, LEE J., Ph.D. (Michigan State University)
Associate Professor, Instructional Leadership and Support

MULLINS, JOHN T., Ph.D. (University of North Carolina)
Professor, Botany

MUNSON, JOHN B., Ph.D. (University of Rochester)
Associate Professor, Physiology

MUSCHLITZ, JR., EARLE E., Ph.D. (Pennsylvania State University)
Professor, Chemistry

MUSGRAVE, CAROL A., Ph.D. (Oregon State University)
Assistant Professor, Entomology and Nematology

MUTH, EGINHARD J., Ph.D. (Polytechnic Institute of Brooklyn)
Professor, Industrial and Systems Engineering

MUTHARD, JOHN E., Ph.D. (Ohio State University)
Professor, Rehabilitation Counseling

MUZYCZKA, NICHOLAS, Ph.D. (Johns Hopkins University)
Assistant Professor, Immunology and Medical Microbiology

MYERS, GARDINER H., Ph.D. (University of California at Berkeley)
Associate Professor, Chemistry

MYERS J. M., M.S. (University of Florida)
Professor, Agricultural Engineering

MYERS, LESTER H., Ph.D. (Purdue University)
Professor, Food and Resource Economics

MYERS, ROBERT B., Ed.D. (University of Florida)
Professor, Subject Specialization Teacher Education

MYRICK, ROBERT D., Ph.D. (Arizona State University)
Professor, Counselor Education

NATION, JAMES L., Ph.D. (Cornell University)
Professor, Entomology and Nematology

NATTRESS, JOHN A., D.Eng. (Embry Riddle)
Professor, Industrial and Systems Engineering

NATTRESS, MARGARET P., M.A. (Northwestern University)
Associate Professor, Speech

NAYER, JAI K., Ph.D. (University of Illinois)
Adjunct Associate Professor, Entomology and Nematology

NAYLOR, JOHN G., M.F.A. (University of Illinois)
Professor, Art

NEAL, FRED C., M.S. (Texas A & M University)
Associate Professor, Veterinary Medicine

NEILSON, JOHN T., Ph.D. (University of Glasgow)
Professor, Veterinary Medicine

NEIMS, ALLEN H., M.D. (Johns Hopkins University)
Professor, Pharmacology and Therapeutics

NELL, TERRIL A., Ph.D. (Michigan State University)
Assistant Professor, Horticultural Science

NELSON, CHARLES W., Ph.D. (University of Maryland)
Professor, Mathematics

NELSON, MARIE, Ph.D. (University of Oregon)
Associate Professor, English

NEUGROSCHEL, ARNOST, Ph.D. (Technion Israel Institute of Technology)
Associate Professor, Electrical Engineering

NEVILL, DOROTHY D., Ph.D. (University of Florida)
Associate Professor, Psychology

NEVILL, JR., GALE E., Ph.D. (Stanford University)
Professor, Engineering Sciences

NEVIS, ARNOLD H., Ph.D. (Massachusetts Institute of Technology)
Professor, Electrical Engineering

NEW, MELVYN , Ph.D. (Vanderbilt University)
Professor, English

NEWCOMB, JR., ARTHUR P., Ph.D. (Stanford University)
Associate Professor, Subject Specialization Teacher Education

NEWELL, JOHN M., Ph.D. (University of Texas at Austin)
Professor, Foundations of Education

NEWMAN, ARTHUR J., Ed.D. (Indiana University)
Professor, Foundations of Education

NICHOLS, WILMER W., Ph.D. (University of Alabama)
Associate Professor, Physiology

NICKENS, JOHN M., Ph.D. (Florida State University)
Associate Professor, Educational Administration and Supervision

NICOL, DAVID, Ph.D. (Stanford University)
Professor, Zoology

NICOLETTI, PAUL L., M.S. (University of Wisconsin)
Professor, Veterinary Medicine

NIDDRIE, DAVID L., Ph.D. (University of Manchester)
Professor, Geography

NOONAN, KENNETH D., Ph.D. (Princeton University)
Associate Professor, Biochemistry and Molecular Biology

NOONAN, NORINE E., Ph.D. (Princeton University)
Assistant Professor, Veterinary Medicine

NORDEN, ALLAN J., Ph.D. (Iowa State University)
Professor, Agronomy

NORDLIE, FRANK G., Ph.D. (University of Minnesota)
Professor, Zoology

NORDSTEDT, ROGER A., Ph.D. (Ohio State University)
Associate Professor, Agricultural Engineering

NORMANN, SIGURD J., Ph.D. (University of Washington)
Professor, Pathology

NOTELOVITZ, MORRIS, Ph.D. (University of Stellenbosch)
Associate Professor, Obstetrics and Gynecology

NUNEZ, JR., THERON A., Ph.D. (University of California at Berkeley)
Associate Professor, Anthropology

NUNNERY, MICHAEL Y., Ed.D. (University of Tennessee)
Professor, Educational Administration and Supervision

NUTTER, RONALD E., Ph.D. (University of Michigan)
Assistant Professor, Special Education

NYE, DAVID J., Ph.D. (University of Pennsylvania)
Associate Professor, Finance, Insurance, and Real Estate

O'BRIEN, THOMAS W., Ph.D. (University of Manchester)
Professor, Biochemistry and Molecular Biology

O'SULLIVAN, PATRICK M., Ph.D. (London School of Economics)
Professor, Geography

OBERLANDER, HERBERT, Ph.D. (Case Western Reserve University)
Associate Professor, Entomology and Nematology

OBERLIN, LYNN C., Ed.D. (Michigan State University)
Professor, General Teacher Education

OBLINGER, JAMES L., Ph.D. (Iowa State University)
Associate Professor, Food Science and Human Nutrition

OCHI, MICHAEL K., Ph.D. (American University)
Professor, Coastal and Oceanographic Engineering

O'CONNELL, JOHN, Ph.D. (University of California at Berkeley)
Professor, Chemical Engineering

O'CONNOR, JOHN A., M.A. (University of California at Berkeley)
Associate Professor, Art

OCUMPAUGH, WILLIAM R., Ph.D. (University of Missouri)
Assistant Professor, Agronomy

ODUM, HOWARD T., Ph.D. (Yale University)
Graduate Research Professor, Environmental Engineering Sciences

OHANIAN, MIHRAN J., Ph.D. (Rensselaer Polytechnic Institute)
Professor, Nuclear Engineering Sciences

OHRN, NILS Y., Ph.D. (Uppsala University)
Professor, Chemistry

OLEJNIK, STEPHEN, Ph.D. (Michigan State University)
Assistant Professor, Foundations of Education

OLIVER, CALVIN C., Ph.D. (Purdue University)
Professor, Mechanical Engineering

OLIVER, JOHN P., Ph.D. (University of California at Los Angeles)
Associate Professor, Astronomy

OLIVER SMITH, ANTHONY R., Ph.D. (Indiana University)
Associate Professor, Anthropology

OLSON, ARTHUR H., Ed.D. (Northern Illinois University)
Associate Professor, Instructional Leadership and Support

OLSON, TIMOTHY A., M.S. (Iowa State University)
Assistant Professor, Animal Science

OLSSON, CARL N., Ph.D. (University of Florida)
Associate Professor, Astronomy

OMALLEY, JOHN R., Ph.D. (University of Florida)
Professor, Electrical Engineering

OMER, JR., GUY C., Ph.D. (California Institute of Technology)
Professor, Astronomy

ONODA, JR., GEORGE Y., Ph.D. (Massachusetts Institute of Technology)
Professor, Materials Science and Engineering

ORAND, MICHAEL G., Ph.D. (Temple University)
Associate Professor, Anatomy

ORTH, PAUL G., Ph.D. (University of Wisconsin)
Associate Professor, Soil Science

OSTERBIND, CARTER C., Ph.D. (American University)
Professor, Marketing

OTIS, ARTHUR B., Ph.D. (Brown University)
Professor, Physiology

OTT, EDGAR A., Ph.D. (Purdue University)
Professor, Animal Science

OVERMAN, ALLEN R., Ph.D. (University of North Carolina)
Professor, Agricultural Engineering

OVERMAN, AMEGDA, J., M.S. (University of Florida)
Professor, Entomology and Nematology

PACKER, ATHOL B., Ph.D. (University of Kansas)
Associate Professor, General Teacher Education

PAGANINI, LOUIS A., Ph.D. (University of Florida)
Associate Professor, Geography

PAIGE, ARNOLD, Ph.D. (University of California at Berkeley)
Associate Professor, Electrical Engineering

PALEŃIK, GUS, Ph.D. (University of Southern California)
Professor, Chemistry

PALMER, ARNO Z., Ph.D. (University of Missouri)
Professor, Animal Science

PALMORE, WILLIAM P., Ph.D. (Yale University)
Associate Professor, Veterinary Medicine

PANUSH, RICHARD S., M.D. (University of Michigan)
Associate Professor, Immunology and Medical Microbiology

PAREDES, JAMES A., Ph.D. (University of New Mexico)
Associate Professor, Anthropology

PARKER, WOODROE M., Ph.D. (University of Florida)
Assistant Professor, Counselor Education

PARTHENIADES, EMMANUEL, Ph.D. (University of California at Berkeley)
Professor, Engineering Sciences

PATE, FINDLAY M., Ph.D. (University of Georgia)
Associate Professor, Animal Science

PATRAY, JOANN H., M.S.N. (University of Florida)
Associate Professor, Nursing

PATTERSON, RICHARD S., Ph.D. (Cornell University)
Professor, Entomology and Nematology

PATTON, DONALD J., Ph.D. (Harvard University)
Professor, Geography

PATZ, DENNIS H., Ph.D. (University of Texas at Austin)
Associate Professor, Accounting

PAUL, HARRY W., Ph.D. (Columbia University)
Professor, History

PENNYPACKER, JR., HENRY S., Ph.D. (Duke University)
Professor, Psychology

PEPINE, CARL J., M.D. (New Jersey College)
Associate Professor, Medicine

PEPINSKY, RAYMOND, Ph.D. (University of Chicago)
Professor, Physics

PERCY, LANCE E., Ed.D. (University of Virginia)
Assistant Professor, Counselor Education

PERLETTE, JOHN M., Ph.D. (University of Chicago)
Associate Professor, English

PERRIN, JOHN H., Ph.D. (University of Paris)
Professor, Pharmacy

PERRY, JR., NATHAN W., Ph.D. (Florida State University)
Professor, Clinical Psychology

PERRY, VERNON G., Ph.D. (University of Wisconsin)
Professor, Entomology and Nematology

PERSON, WILLIS B., Ph.D. (University of California at Berkeley)
Professor, Chemistry

PERUMAREDDI, JAYARAMA R., Ph.D. (University of Southern California)
Professor, Chemistry

PETERSON, LENNART R., Ph.D. (Massachusetts Institute of Technology)
Professor, Physics

PETTWAY, RICHARD H., Ph.D. (University of Texas at Austin)
Professor, Finance, Insurance, and Real Estate

PEVONKA, M. P., M.S.P. (University of Florida)
Associate Professor, Pharmacy

PFAHLER, PAUL L., Ph.D. (Purdue University)
Professor, Agronomy

PHILLIPS, RICHARD L., Ph.D. (Michigan State University)
Associate Professor, Horticultural Science

PICKARD, JOHN B., Ph.D. (University of Wisconsin)
Professor, English

PIERCE, FRANK N., Ph.D. (University of Illinois)
Professor, Journalism and Communications

PIERCE, ROBERT N., Ph.D. (University of Minnesota)
Professor, Journalism and Communications

PIERCE, JR., ROBERT W., Ph.D. (University of Illinois)
Associate Professor, Geology

PIOTROWSKI, GEORGE, Ph.D. (Massachusetts Institute of Technology)
Associate Professor, Mechanical Engineering

PIRKLE, EARL C., Ph.D. (University of Cincinnati)
Professor, Geology

PISANI, JOSEPH R., Ph.D. (University of Maryland)
Professor, Journalism and Communications

PITTS, JAMES H., Ph.D. (University of Northern Colorado)
Assistant Professor, Counselor Education

PLEASANTS, JULIAN M., Ph.D. (University of North Carolina)
Associate Professor, History

PLUTZKY, MAX, M.D. (University of Havana)
Professor, Psychiatry

POE, SIDNEY L., Ph.D. (University of Missouri)
Professor, Entomology and Nematology

POHL, MARY E., Ph.D. (Harvard University)
Assistant Professor, Anthropology

POHRONEZNY, KENNETH L., Ph.D. (Ohio State University)
Assistant Professor, Plant Pathology

POLOPOLUS, LEO, Ph.D. (University of California at Berkeley)
Professor, Food and Resource Economics

POOLE, REID, M.A. (University of Chicago)
Professor, Music

POOLE, RICHARD T., Ph.D. (University of Florida)
Professor, Horticultural Science

POP STOJANOVIC, ZORAN R., Ph.D. (Faculty for Mathematical and Natural Sciences in Belgrade)
Professor, Mathematics

POPENOE, HUGH L., Ph.D. (University of Florida)
Professor, Soil Science

POPOV, VASILE M., Ph.D. (Romanian Academy)
Professor, Mathematics

POPP, DANIEL M., Ph.D. (University of Chicago)
Associate Professor, Germanic and Slavic Languages and Literatures

POPPER, EDWARD T., D.B.A. (Harvard University)
Assistant Professor, Marketing

POSNER, PHILIP, Ph.D. (Downstate Medical Center of New York)
Associate Professor, Physiology

POST, DON M., M.S.F. (University of Florida)
Associate Professor, Forest Resources and Conservation

POWELL, WILLIAM R., Ed.D. (Indiana University)
Professor, Instructional Leadership and Support

POZZETTA, GEORGE E., Ph.D. (University of North Carolina)
Associate Professor, History

PRESTON, III, JAMES F., Ph.D. (University of Minnesota)
Associate Professor, Microbiology and Cell Science

PREVIC, EDWARD P., Ph.D. (University of Illinois)
Associate Professor, Microbiology and Cell Science

PRINE, GORDON M., Ph.D. (Ohio State University)
Professor, Agronomy

PRING, DARYL R., Ph.D. (North Dakota State)
Professor, Plant Pathology

PRITCHETT, WILLIAM L., Ph.D. (Iowa State University)
Professor, Soil Science

PROCHASKA, FREDERICK J., Ph.D. (University of North Carolina)
Professor, Food and Resource Economics

PROCTOR, SAMUEL, Ph.D. (University of Florida)
Distinguished Service Professor, History

PURCIFULL, DAN E., Ph.D. (University of California at Berkeley)
Professor, Plant Pathology

PURDY, BARBARA A., Ph.D. (University of Florida)
Associate Professor, Anthropology

PURDY, LAURENCE H., Ph.D. (University of California at Davis)
Professor, Plant Pathology

PYATT, EDWIN E., Dr.Eng. (Johns Hopkins University)
Professor, Environmental Engineering Sciences

QUESENBERRY, KENNETH H., Ph.D. (University of Kentucky)
Assistant Professor, Agronomy

RABIEGA, WILLIAM A., Ph.D. (Southern Illinois University)
Assistant Professor, Geography

RADCLIFFE, ROBERT C., Ph.D. (Ohio State University)
Associate Professor, Finance, Insurance, Real Estate and Urban Land Studies

RAMEY, JR., ROBERT A., Ph.D. (University of Cincinnati)
Professor, Electrical Engineering

RAND, KENNETH H., M.D. (Stanford University)
Assistant Professor VA, Pathology

RANDAZZO, ANTHONY, F., Ph.D. (University of North Carolina)
Professor, Geology

RAO, KOPPAKA V., Ph.D. (University of Wisconsin)
Professor, Medicinal Chemistry

RAO, PEJAVER V., Ph.D. (University of Georgia)
Professor, Statistics

RASBURY, WILEY C., Ph.D. (Bowling Green State University)
Associate Professor, Clinical Psychology

RAY, DELMAS D., Ph.D. (University of Florida)
Professor, Accounting

RAY, JR., JORDAN B., J.D. (University of Florida)
Professor, Management

REDDY, KONDA R., Ph.D. (Louisiana State University)
Assistant Research Scientist, Soil Science

REED HILL, ROBERT E., D E. (Yale University)
Professor, Materials Science and Engineering

REEVES, FRANK B., M.Arch. (University of Florida)
Professor, Architecture

REICHARD, CARY L., Ed.D. (University of Northern Colorado)
Associate Professor, Special Education

REID, CHARLES E., Ph.D. (Louisiana State University)
Associate Professor, Chemistry

REID, WILLIAM R., Ph.D. (Iowa State University)
Professor, Special Education

REINERT, JAMES A., Ph.D. (Clemson University)
Professor, Entomology and Nematology

REISKIND, JONATHAN, Ph.D. (Harvard University)
Associate Professor, Zoology

REITZ, JR., HARRY J., Ph.D. (Massachusetts Institute of Technology)
Professor, Management

REITZ, HERMAN J., Ph.D. (Ohio State University)
Professor, Horticultural Science

REKERS, GEORGE A., Ph.D. (University of California at Los Angeles)
Associate Professor, Clinical Psychology

REMSEN, JOYCE F., Ph D. (Rutgers State University)
Assistant Professor, Biochemistry and Molecular Biology

RENNER, RICHARD R., Ph.D. (University of Texas at Austin)
Professor, Foundations of Education

RESNICK, JAQUELYN L., Ph.D. (University of Florida)
Assistant Professor, Counselor Education

RESNICK, MICHAEL B., Ed.D. (University of Florida)
Assistant Professor, Pediatrics

REYNOLDS, JOHN E., Ph.D. (Iowa State University)
Associate Professor, Food and Resource Economics

RHINES, FREDERICK N., Ph.D (Yale University)
Distinguished Service Professor, Materials Science and Engineering

RHOADES, HARLAN L., Ph.D. (University of Illinois)
Professor, Entomology and Nematology

RHOADS, FREDERIK M., Ph.D. (Mississippi State University)
Professor, Soil Science

RHUE, ROY D., Ph.D (Oregon State University)
Assistant Professor, Soil Science

RICE, PRUDENCE M., Ph.D. (Pennsylvania State University)
Assistant Professor, Anthropology

RICE, WARREN J., Ph.D. (Case Western Reserve University)
Assistant Professor, Clinical Psychology

RICH, JIMMY R., Ph.D. (University of California at Riverside)
Assistant Professor, Entomology and Nematology

RICHARD, GEORGE, A., M.D. (University of Pittsburgh)
Professor, Pediatrics

RICHARDS, PAMELA J., Ph.D. (Northwestern University)
Assistant Professor, Sociology

RICHARDSON, JAMES G., M.A. (University of Florida)
Professor, Finance, Insurance and Real Estate

RICHTER, MICHAEL F., Ph.D. (University of Florida)
Assistant Professor, Animal Science

RIDGDILL, GARY D., M.Arch. (Massachusetts Institute of Technology)
Associate Professor, Architecture

RIDINGS, WILLIAM H., Ph.D. (University of North Carolina)
Adjunct Assistant Professor, Plant Pathology

RIEKERK, HANS, Ph.D (University of Washington)
Assistant Professor, Forest Resources and Conservation

RIENZO, BARBARA A., Ph.D. (Southern Illinois University)
Assistant Professor, Health Education and Safety

RIKER, HAROLD C., Ed.D. (Columbia University)
Professor, Counselor Education

RITTER, GERHARD, Ph.D. (University of Wisconsin)
Associate Professor, Mathematics

ROAN, JR., VERNON P., Ph.D. (University of Illinois)
Professor, Mechanical Engineering

ROBBINS, RALPH C., Ph.D. (University of Illinois)
Associate Professor, Food Science and Human Nutrition

ROBERTS, BENJAMIN J., Ph.D (Pennsylvania State University)
Assistant Professor, Psychology

ROBERTS, DANIEL A., Ph.D. (Cornell University)
Professor, Plant Pathology

ROBERTS, RICHARD H., Ph.D. (University of Wisconsin)
Adjunct Professor, Entomology and Nematology

ROBERTS, ROBERT M., Ph.D. (Oxford University)
Professor, Biochemistry and Molecular Biology

ROBERTSON, WILLIAM K., Ph.D. (Purdue University)
Professor, Soil Science

ROBINSON, FRANK A., M.S. (Auburn University)
Professor, Entomology and Nematology

ROBINSON, WILLIAM R., Ph D. (Ohio State University)
Professor, English

ROCKWOOD, DONALD L., Ph D. (University of North Carolina
Assistant Professor, Forest Resources and Conservation

RODGERS, BRADLEY M., M.D. (Johns Hopkins University)
Professor, Surgery

RODGERS, EARL G., Ph.D (Iowa State University)
Professor, Agronomy

ROESSLER, CHARLES E., Ph.D. (University of Florida)
Professor, Environmental Engineering Sciences

ROESSLER, GENEVIEVE S., Ph.D (University of Florida)
Assistant Professor, Nuclear Engineering Sciences

ROGERS, CLARENCE J., M.Ag (University of Florida)
Professor Emeritus, Agricultural Engineering

ROGERS, JAMES S., Ph.D. (University of Illinois)
Adjunct Associate Professor, Agricultural Engineering

ROMRELL, LYNN J., Ph.D. (Utah State University)
Associate Professor, Anatomy

ROSENBAUM, WALTER A., Ph.D. (Princeton University)
Professor, Political Science

ROSS, CLAUDIUS A., Ph.D. (University of Florida)
Professor, Engineering Sciences

ROSS, MICHAEL H., Ph.D. (New York University)
Professor, Anatomy

ROTHBERG, ROBERT A., (Florida State University)
Professor, Instructional Leadership and Support

ROTHMAN, HOWARD B., Ph.D. (Stanford University)
Associate Professor, Speech

ROTHWELL, DONALD F., Ph D. (Purdue University)
Professor, Soil Science

ROWE, MARY B., Ph.D. (Stanford University)
Professor, Subject Specialization Teacher Education

RUELKE, OTTO C., Ph.D. (University of Wisconsin)
Professor, Agronomy

RUMBLE, JAMES D., M.S. (Rensselaer Polytechnic Institute)
Associate Professor, Civil Engineering

RUTH, BYRON E., Ph.D. (West Virginia University)
Professor, Civil Engineering

RYDEN, SALLY E., M.D. (University of Michigan)
Assistant Professor, Pathology

RYSCHKEWITSCH, GEORGE E., Ph.D. (Ohio State University)
Professor, Chemistry

SABATELLA, JOSEPH J., M.F.A. (University of Illinois)
Professor, Art

SABIN, JOHN R., Ph.D. (University of New Hampshire)
Professor, Physics

SAH, CHIH-TANG, Ph.D. (Stanford University)
Consultant Lecturer, Electrical Engineering

SAILER, REECE I., Ph.D. (Kansas State University)
Graduate Research Professor, Entomology and Nematology

SAINE, III, THOMAS J., Ph.D. (Northwestern University)
Associate Professor, Speech

SAND, ROBERT S., Ph.D. (University of Kentucky)
Associate Professor, Animal Science

SANDEEN, CARL A., Ph.D. (Michigan State University)
Professor, Educational Administration and Supervision

SANDERSON, JOHN A., M.U.P. (Wayne State University)
Associate Professor, Architecture

SANDOR, GEORGE N., En.Sc.D. (Columbia University)
Professor, Mechanical Engineering

SARTAIN, JERRY B., Ph.D. (North Carolina State University)
Associate Professor, Soil Science

SATZ, PAUL, Ph.D. (University of Kentucky)
Professor, Clinical Psychology

SAULS, JULIAN W., Ph.D. (University of Florida)
Assistant Professor, Horticultural Science

SAUNDERS, SCOTT G., Ph.D. (Johns Hopkins University)
Assistant Professor, Economics

SAVITT, TODD L., Ph.D. (University of Virginia)
Assistant Professor, History

SAW, JOHN G., Ph.D. (London University)
Professor, Statistics

SAXON, JOHN P., Ph.D. (University of Georgia)
Associate Professor, Rehabilitation Counseling

SAXON, STEPHEN A., Ph.D. (Florida State University)
Associate Professor, Mathematics

SCHANK, STANLEY C., Ph.D. (University of California at Davis)
Professor, Agronomy

SCHAUB, JAMES H., Ph.D. (Purdue University)
Professor, Civil Engineering

SCHAUBLE, PAUL G., Ph.D. (Michigan State University)
Professor, Psychology

SCHEAFFER, RICHARD, Ph.D. (Florida State University)
Professor, Statistics

SCHEFFER, GEORGE, M.Arch. (University of Florida)
Associate Professor, Architecture

SCHEIRER, ELINOR A., Ph.D. (Ohio State University)
Associate Professor, Instructional Leadership and Support

SCHENCK, NORMAN C., Ph.D. (University of Illinois)
Professor, Plant Pathology

SCHER, RICHARD K., Ph.D. (Columbia University)
Associate Professor, Political Science

SCHLENKER, BARRY R., Ph.D. (State University of New York at Albany)
Associate Professor, Psychology

SCHMELING, GARETH L., Ph.D. (University of Wisconsin)
Professor, Classics

SCHMID, GERHARD M., Ph.D. (University of Innsbruck)
Associate Professor, Chemistry

SCHMID, REX E., Ed.D. (University of Virginia)
Associate Professor, Special Education

SCHMIDT, PATRICIA, Ph.D. (Pennsylvania State University)
Associate Professor, Speech

SCHMIDT, ROBERT A., Ph.D. (Pennsylvania State University)
Professor, Forest Resources and Conversation

SCHMIDT, RONALD H., Ph.D. (University of Minnesota)
Associate Professor, Food Science and Human Nutrition

SCHMITT, JOHN P., M.B.A. (Florida State University)
Visiting Assistant Professor, Health and Hospital Administration

SCHNEIDER, NATHAN J., Ph.D. (University of Pittsburgh)
Assistant Professor, Microbiology and Cell Science

SCHNEIDER, RICHARD T., Ph.D. (University of Stuttgart)
Professor, Nuclear Engineering Sciences

SCHOEN, FREDERICK J., Ph.D. (Cornell University)
Assistant Professor, Materials Science and Engineering

SCHOESSOW, GLEN J., M.S.M.E. (Purdue University)
Professor, Nuclear Engineering Sciences

SCHOLES, ROBERT J., Ph.D. (Indiana University)
Professor, Speech

SCHRODER,VINCENT N., Ph.D. (Duke University)
Associate Professor, Agronomy

SCHULMAN, IVAN A., Ph.D. (University of California at Los Angeles)
Graduate Research Professor, Latin American Studies

SCHULMAN, STEPHEN G., Ph.D. (University of Arizona)
Professor, Pharmacy

SCHULTZ, FRANKLIN A., Ph.D. (University of California at Riverside)
Associate Professor, Chemistry

SCHULTZ, RONALD R., Ph.D. (University of Washington)
Assistant Professor, Geography

SCHUNCKE, GEORGE, M., Ph.D. (Stanford University)
Assistant Professor, General Teacher Education

SCHUSTER, DAVID J., Ph.D. (Oklahoma State University)
Assistant Professor, Entomology and Nematology

SCHWARTZ, MICHAEL A., Ph.D. (University of Wisconsin)
Professor, Pharmacy

SCHWARTZ, STUART E., Ed.D. (University of Kansas)
Associate Professor, Special Education

SCHWASSMANN, HORST O., Ph.D. (University of Wisconsin)
Professor, Zoology

SCORNIK, JUAN C., M.D. (University of La Plata)
Assistant Professor, Pathology

SCOTT, JERRIE C., Ph.D. (University of Michigan)
Assistant Professor, English

SCOTT, THOMAS A., Ph.D. (Harvard University)
Professor, Physics

SCROGGIE, JR., EVERETT, M.A. (University of Tennessee)
Assistant Professor, Communicative Disorders

SEAMAN, JR., WILLIAM, Ph.D. (University of Florida)
Assistant Professor, Forest Resources and Conservation

SEARS, WILLIAM H., Ph.D. (University of Michigan)
Professor, Anthropology

SEAWRIGHT, JACK A., Ph.D. (University of Florida)
Associate Professor, Entomology and Nematology

SEILER, GARY D., Ed.D. (University of Massachusetts)
Assistant Professor, Counselor Education

SELF, MORRIS W., Ph.D. (University of Minnesota)
Professor, Civil Engineering

SELFRIDGE, RALPH G., Ph.D. (University of Oregon)
Professor, Computer and Information Sciences

SELMAN, KAY E., Ph.D. (Harvard University)
Associate Professor, Anatomy

SEVERY, LAWRENCE J., Ph.D. (University of Colorado)
Associate Professor, Psychology

SHAAK, GRAIG D., Ph.D. (University of Pittsburgh)
Associate Instructor, Geology

SHADGETT, JOHN N., Ed.D. (Florida State University)
Associate Professor, Instructional Leadership and Support

SHAFFER, CHARLES V., Ph.D. (Stanford University)
Professor, Electrical Engineering

SHAH, DINESH O., Ph.D. (Columbia University)
Professor, Chemical Engineering

SHANDS, JR., JOSEPH W., M.D. (Duke University)
Professor, Immunology and Medical Microbiology

SHANOR, LELAND, Ph.D. (University of North Carolina)
Professor, Botany

SHARP, BERT L., Ed.D. (University of Florida)
Professor, Counselor Educaton

SHARP, III, DANIEL C., Ph.D. (University of Massachusetts)
Associate Professor, Animal Science

SHARP, JENNIFER L., Ph.D. (University of Hawaii)
Assistant Professor, Entomology and Nematology

SHAW, HARRY B., Ph.D. (University of Illinois)
Associate Professor, English

SHAW, LAWRANCE N., Ph.D. (Ohio State University)
Professor, Agricultural Engineering

SHAW, LELAND G., M.Arch. (University of California at Berkeley)
Professor, Architecture

SHAW, MARVIN E., Ph.D. (University of Michigan)
Professor, Psychology

SHEA, JOSEPH J., Ph.D. (University of Michigan)
Associate Professor, General Teacher Education

SHEEHAN, THOMAS J., Ph.D. (Cornell University)
Professor, Horticultural Science

SHELTON, DAVID L., Ph.D. (Missouri University)
Associate Professor, Theatre

SHEMDIN, OMAR H., Ph.D. (Stanford University)
Professor, Coastal and Oceanographic Engineering

SHEPPARD, DONALD M., Ph.D. (Arizona State University)
Associate Professor, Coastal and Oceanographic Engineering

SHERMAN, ROBERT R., Ed.D (Rutgers State University)
Professor, Foundations of Education

SHERMAN, WAYNE B., Ph.D. (Purdue University)
Professor, Horticultural Science

SHIELDS, ROBERT P., Ph.D (Michigan State University)
Associate Professor, Pathology

SHIH, SUN-FU, Ph.D. (University of North Carolina)
Associate Professor, Agricultural Engineering

SHIREMAN, JEROME V., Ph.D. (Iowa State University)
Associate Professor, Forest Resources and Conservation

SHIRLEY, RAY L., Ph.D. (Michigan State University)
Professor, Animal Science

SHIVERICK, KATHLEEN A., Ph.D. (Vermont State University)
Affiliate Assistant Professor, Pharmacology and Therapeutics

SHORT, DONALD E., Ph.D. (University of Nebraska)
Associate Professor, Entomology and Nematology

SHUMAKER, JAMES R., Ph.D. (University of Minnesota)
Associate Professor, Horticultural Science

SHUSTER, JONATHAN J., Ph.D. (McGill University)
Associate Professor, Statistics

SIDERS, RONALD A., Ph.D. (University of Oregon)
Assistant Professor, Professional Physical Education

SIDMAN, CHARLES F., Ph.D. (University of Wisconsin)
Professor, History

SIEG, KAY W., M.Ed. (University of Florida)
Associate Professor, Occupational Therapy

SIEKA, FRANK L., Ph.D. (University of Buffalo)
Clinical Assistant Professor, Rehabilitation Counseling

SIERAKOWSKI, ROBERT L., D.Eng. (Yale University)
Professor, Engineering Sciences

SIGMON, KERMIT N., Ph.D. (University of Florida)
Associate Professor, Mathematics

SILHACEK, DONALD L., Ph.D. (University of Wisconsin)
Associate Professor, Entomology and Nematology

SILVERMAN, DAVID N., Ph.D. (Columbia University)
Associate Professor, Pharmacology and Therapeutics

SIMMONS, JOHN K., Ph.D. (Ohio State University)
Professor, Accounting

SIMON, THOMAS W., Ph.D. (Washington University)
Associate Professor, Philosophy

SIMPKINS, JAMES W., Ph.D. (Michigan State University)
Assistant Professor, Pharmacy

SIMPSON, CHARLES F., Ph.D. (University of Minnesota)
Professor, Veterinary Medicine

SIMPSON, JAMES R., Ph.D. (Texas A & M University)
Associate Professor, Food and Resource Economics

SINGLETON, GEORGE T., M.D. (Baylor University)
Professor, Speech

SINGLEY, JOHN E., Ph.D. (University of Florida)
Professor, Environmental Engineering Sciences

SISLER, HARRY H., Ph.D. (University of Illinois)
Distinguished Service Professor, Chemistry

SIVAZLIAN, BOGHOS D., Ph.D. (Case Western Reserve University)
Professor, Industrial and Systems Engineering

SKEEN, E. M., Ph.D. (University of Michigan)
Assistant Professor, Curriculum and Instruction

SKINNER, T. C., M.Ag. (University of Florida)
Professor, Agricultural Engineering

SLAYMAKER, CAROLYN J., M.A. (University of Florida)
Associate Professor, Occupational Therapy

SMAJSTRIA, ALLEN G., Ph.D. (Texas A & M University)
Assistant Professor, Agricultural Engineering

SMALL, JR., PARKER A., M.D. (University of Cincinnati)
Professor, Immunology and Medical Microbiology

SMART, JR., G. C., Ph.D. (University of Wisconsin)
Professor, Entomology and Nematology

SMERAGE, GLEN H., Ph.D. (Stanford University)
Associate Professor, Agricultural Engineering

SMEYAK, GERALD P., Ph.D. (Ohio University)
Professor, Journalism and Communications

SMITH, ALBERT B., Ph.D. (University of North Carolina)
Professor, Romance Languages and Literatures

SMITH, III, ALBERT B., Ph.D. (University of Michigan)
Associate Professor, Instructional Leadership and Support

SMITH, ALEX G., Ph.D. (Duke University)
Professor, Astronomy

SMITH, CECIL N., Ph.D. (University of California at Berkeley))
Professor, Food and Resource Economics

SMITH, DAVID C., Ph.D. (Northwestern University)
Professor, Educational Administration and Supervision

SMITH, DOUGLAS L., Ph.D. (University of Minnesota)
Associate Professor, Geology

SMITH, EMMETT D., Ph.D. (Ohio State University)
Associate Professor, Accounting

SMITH, JR., HAYWOOD C., Ph.D. (University of Virginia)
Associate Professor, Astronomy

SMITH, JR., HALBERT C., D.B.A. (University of Illinois)
Professor, Finance, Insurance, and Real Estate

SMITH, HERRICK M., M.L.A. (University of Georgia)
Professor, Architecture

SMITH, JACK R., Ph.D. (University of Southern California)
Professor, Electrical Engineering

SMITH, KENNETH L., Ph.D. (University of Missouri)
Associate Professor, Dairy Science

SMITH, LAWRENCE L., Ph.D. (University of Illinois)
Assistant Professor, Instructional Leadership and Support

SMITH, P.H., Ph.D. (University of California at Berkeley)
Professor, Microbiology and Cell Science

SMITH, REX L., Ph.D. (Iowa State University)
Professor, Agronomy

SMITH, RICHARD C., Ph.D. (Duke University)
Professor, Botany

SMITH, RICHARD T., M.D. (Tulane University)
Professor, Pathology

SMITH, STANLEY K., Ph.D. (University of Michigan)
Assistant Professor, Economics

SMITH, WAYNE H., Ph.D. (Mississippi State University)
Professor, Forest Resources and Conservation

SMITTLE, BURRELL J., Ph.D. (Rutgers State University)
Professor, Entomology and Nematology

SMUTZ, MORTON, Ph.D. (University of Wisconsin)
Professor, Chemical Engineering

SNIDER, MARTHA J., Ed.S. (University of Florida)
Associate Professor, Nursing

SNODGRASS, CHRIS G., Ph.D. (University of Buffalo)
Associate Professor, English

SNOWBALL, DOUG A., Ph.D. (Monash University)
Assistant Professor, Accounting

SNYDER, PATRICIA, Ph.D. (University of California at San Diego)
Assistant Professor, Chemistry

SOAR, ROBERT S., Ph.D. (University of Minnesota)
Professor, Foundations of Education

SOARES, GLAUCIO A., Ph.D. (Washington University)
Professor, Latin American Studies

SOFIA, SABATINO, Ph.D. (Yale University)
Professor, Astronomy

SOLDWEDEL, BETTE J., Ed.D. (New York University)
Professor, Counselor Education

SOLIS, MANUEL M., M.S.E. (University of Florida)
Associate Professor, Architecture

SOMMERVILLE, CHARLES J., Ph.D. (University of Iowa)
Associate Professor, History

SONODA, RONALD M., Ph.D. (University of California at Davis)
Associate Professor, Plant Pathology

SOULE, JAMES, Ph.D. (University of Florida)
Professor, Horticultural Science

SPANGLER, BYRON D., M.S. (University of Florida)
Professor, Civil Engineering

SPANGLER, DANIEL P., Ph.D. (University of Arizona)
Associate Professor, Geology

SPANIER, JOHN W., Ph.D. (Yale University)
Professor, Political Science

SPINKS, DANIEL O., Ph.D. (University of North Carolina)
Professor, Soil Science

SPREEN, THOMAS H., Ph.D. (Purdue University)
Assistant Professor, Food and Resource Economics

SPRING, ANITA, Ph D (Cornell University)
Associate Professor, Anthropology

SPURLOCK, CARL W., Ph.D. (University of Oklahoma)
Associate Professor, Geography

SQUILLACE, ANTHONY E., Ph.D. (University of Florida)
Adjunct Professor, Forest Resources and Conservation

ST. JACQUES, ERNEST H., Ph.D. (George Peabody College)
Associate Professor, Curriculum and Instruction

STAHMER, HAROLD M., Ph.D. (Cambridge University)
Professor, Religion

STAINSBY, WENDELL N., Sc.D. (Johns Hopkins University)
Professor, Physiology

STALL, ROBERT E., Ph.D. (Ohio State University)
Professor, Plant Pathology

STANLEY, HAROLD R., D.D.S. (University of Maryland)
Professor, Pathology

STARNES, EARL M., Ph.D. (Florida State University)
Professor, Urban and Regional Planning

STEIN, GARY S., Ph.D. (Vermont State University)
Professor, Biochemistry and Molecular Biology

STEIN, GERALD H., M.D. (University of Pennsylvania)
Assistant Professor VA, Medicine

STEIN, JANET L., Ph.D. (Princeton University)
Assistant Professor, Immunology and Medical Microbiology

STETSON, DOROTHY M., Ph.D. (Vanderbilt University)
Assistant Professor, Political Science

STETSON, ROBERT F., Ph.D. (University of Virginia)
Professor, Physics

STEVENS, ANN S., Ph.D. (University of Colorado)
Assistant Professor, Biochemistry and Molecular Biology

STEWART, IVAN, Ph.D. (Rutgers State University)
Professor, Horticultural Science

STEWART, RONALD B., M.S. (University of Florida)
Associate Professor, Pharmacy

STIMAC, JERRY L., Ph.D. (Oregon State University)
Assistant Professor, Entomology and Nematology

STODDARD, ANN H., Ed.D. (University of Georgia)
Associate Professor, General Teacher Education

STOKES, DONALD E., Ph.D. (University of Florida)
Assistant Professor, Entomology and Nematology

STONE, WILLIARD E., Ph.D. (University of Pennsylvania)
Professor, Accounting

STOUFER, ROBERT C., Ph.D. (Ohio State University)
Associate Professor, Chemistry

STOUT, FRANK W., M.S. (Case Western Reserve University)
Associate Professor, Dentistry

STOUTAMIRE, JAMES W., Ph.D. (University of Missouri)
Research Associate, Anthropology

STRAIN, JAMES R., Ph.D. (Oregon State University)
Professor, Food and Resource Economics

STRANDBERG, JAMES O., Ph.D. (University of Wisconsin)
Professor, Plant Pathology

STRAUS, BARRIE R., Ph.D. (University of Iowa)
Associate Professor, English

STRAYER, JOHN R., Ph.D. (University of Florida)
Professor, Entomology and Nematology

STREET, JIMMY J., Ph.D. (Colorado State University)
Assistant Professor, Soil Science

STREETMAN, EDITH Y., B.A. (Florida State University)
Associate Professor, Art

STREIB, GORDON F., Ph.D. (Columbia University)
Graduate Research Professor, Sociology

STRIPLING, ROBERT O., Ed.D. (Columbia University)
Distinguished Service Professor, Counselor Education

STURGILL, CLAUDE C., Ph.D. (University of Kentucky)
Professor, History

SU, STANLEY Y., Ph.D. (University of Wisconsin)
Professor, Electrical Engineering

SUAREZ, ANDRES, LL.B. (University of Havana)
Professor, Latin American Studies

SUCHMAN, DAVID I., Ph.D. (Ohio State University)
Associate Professor, Psychology

SULLIVAN, EDWARD T., D.F. (Duke University)
Associate Professor, Forest Resources and Conservation

SULLIVAN, ROBERT L., Ph.D. (University of Florida)
Professor, Electrical Engineering

SULLIVAN, TIMOTHY J., Ed.D. (Northern Illinois University)
Associate Professor, Instructional Leadership and Support

SULLIVAN, III, WILLIAM J., Ph.D. (Yale University)
Associate Professor, Germanic and Slavic Languages and Literature

SUMMERHILL, JR., WILLIAM R., Ed.D. (North Carolina State University)
Assistant Professor, Agricultural and Extension Education

SUMMEY, JOANNE R., M.N. (University of Florida)
Assistant Professor, Nursing

SURAK, JOHN G., Ph.D. (University of Wisconsin)
Assistant Professor, Food Science and Human Nutrition

SUSSMAN, LEWIS A., Ph.D. (University of North Carolina)
Associate Professor, Classics

SUTHERLAND, ALAN D., Ph.D. (University of Illinois)
Professor, Electric Engineering

SUTTON, DAVID L., Ph.D. (Virginia Polytechnic Institute)
Professor, Agronomy

SUZUKI, HOWARD K., Ph.D. (Tulane University)
Professor, Physical Therapy

SWAIN, RALPH W., Ph.D. (Cornell University)
Associate Professor, Industrial and Systems Engineering

SWANSON, BERT E., Ph.D. (University of Oregon)
Professor, Political Science

SWANSON, RICHARD M., Ph.D. (University of Colorado)
Associate Professor, Psychology

SWINDEL, BENNE F., Ph.D. (University of North Carolina)
Associate Professor, Forest Resources and Conservation

SYPERT, G. W., M.D. (University of Washington)
Associate Professor, Neuroscience

TANNER, GEORGE W., Ph.D. (Texas A & M University)
Assistant Professor, Forest Resources and Conservation

TARJAN, ARMEN C., Ph.D. (University of Maryland)
Professor, Entomology and Nematology

TARRANT, PAUL, Ph.D. (Duke University)
Professor, Chemistry

TATA, ROBERT J., Ph.D. (Syracuse University)
Associate Professor, Geography

TATE,III, ROBERT L., Ph.D. (University of Wisconsin)
Assistant Professor, Microbiology and Cell Science

TATE, SUSAN D., M.S. (University of Tennessee)
Assistant Professor, Architecture

TAYLOR, CAROL E., M.A. (London University)
Assistant Professor, Nursing

TAYLOR, CLIFTON L., Ph.D. (University of Wisconsin)
Assistant Professor, Agricultural and Extension Education

TAYLOR, FRANK H.,
Associate Professor, English

TEAGUE, PERRY D., Ph.D. (University of Oklahoma)
Associate Professor, Pathology

TEAS, DONALD C., Ph.D. (University of Texas at Austin)
Professor, Psychology

TEEM, DAVID H., M.S. (Auburn University)
Associate Professor, Agronomy

TEFERTILLER, KENNETH R., Ph.D. (University of Illinois)
Professor, Food and Resource Economics

TENORE, KENNETH R., Ph.D. (University of North Carolina)
Adjunct Associate Professor, Environmental Engineering Sciences

TEPLY, MARK L., Ph.D. (University of Nebraska)
Associate Professor, Mathematics

TERRELL, TIMOTHY G., D.V.M. (Texas A & M University)
Assistant Professor, Pathology

TESAR, DELBERT, Ph.D. (Georgia Institute of Technology)
Professor, Mechanical Engineering

TEW, ROY E., Ph.D. (Ohio State University)
Professor, Speech

THATCHER, WILLIAM W., Ph.D. (Michigan State University)
Professor, Dairy Science

THOMAS, BILLY S., Ph.D. (Vanderbilt University)
Associate Professor, Physics

THOMPSON, BUFORD D., Ph.D. (University of Florida)
Professor, Horticultural Science

THOMPSON, FLOYD J., Ph.D. (Indiana University)
Assistant Professor, Neuroscience

THOMPSON, NEAL P., Ph.D. (Princeton University)
Professor, Food Science and Human Nutrition

THOMPSON, RALPH B., Ph.D. (University of Texas at Austin)
Professor, Marketing

THOMPSON, ROGER M., Ph.D. (University of Texas at Austin)
Associate Professor, English

THOMPSON, VICTOR A., Ph.D. (Columbia University)
Graduate Research Professor, Political Science

THOMSON, ROBERT S., Ph.D. (Cambridge University)
Associate Professor, English

THORNE, KARL S., M.Arch. (University of Pennsylvania)
Associate Professor, Architecture

THURSBY, GENE R., Ph.D. (Duke University)
Associate Professor, Religion

TILLEY, DANIEL S., Ph.D. (Iowa State University)
Assistant Professor, Food and Resource Economics

TILLMAN, CHESTER E., Ed.D. (University of Florida)
Associate Professor, English

TIMMERMAN, MELVIN E., Ph.D. (University of South Carolina)
Assistant Professor, Subject Specialization Teacher Education

TING, S. V., Ph.D. (Ohio State University)
Professor, Food Science and Human Nutrition

TITTLE, CHARLES R., Ph.D. (University of Texas at Austin)
Professor, Sociology

TJIA, BENNY O., Ph.D. (Ohio State University,)
Assistant Professor, Horticultural Science

TODA, YASUSHI, Ph.D. (Harvard University)
Assistant Professor, Economics

TODD, EUGENE A., D.Ed. (University of Texas at Houston)
Professor, Subject Specialization Teacher Education

TOLBERT, ELIAS L., Ed.D. (Columbia University)
Professor, Counselor Education

TOROSIAN, GEORGE, Ph.D. (University of Wisconsin)
Associate Professor, Pharmacy

TOSI, HENRY, Ph.D. (Ohio State University)
Professor, Management

TOU, JULIUS T., D.Eng. (Yale University)
Graduate Research Professor, Electrical Engineering

TOUHEY, JOHN C., Ph.D. (University of Nevada)
Assistant Professor, Sociology

TRAVIS, DAVID M., M.D. (Vanderbilt University)
Professor, Pharmacology and Therapeutics

TRICKEY, SAMUEL B., Ph.D. (Texas A & M University)
Professor, Physics

TROUPIN, EDWARD C., M.M. (University of Michigan)
Professor, Music

TRUEBLOOD, FELICITY M., M.A. (University of Florida)
Associate Research Scholar, Latin American Studies

TSAI, JAMES H., Ph.D. (Michigan State University)
Associate Professor, Entomology and Nematology

TSIBRIS, JOHN M., Ph.D. (Cornell University)
Visiting Associate Professor, Biochemistry and Molecular Biology

TUCKER, CAROLYN M., Ph.D. (State University of New York)
Assistant Professor, Psychology

TUMLINSON III, JAMES H., Ph.D. (Mississippi State University)
Associate Professor, Entomology and Nematology

TURNER, EDWARD C., Ph.D. (Michigan State University)
Assistant Professor, Instructional Leadership and Support

TURNER, ELDON R., Ph.D. (University of Kansas)
Assistant Professor, History

TWITCHELL, JAMES B., Ph.D. (University of North Carolina)
Associate Professor, English

TYLER, MAX E., Ph.D. (Ohio State University)
Professor, Microbiology and Cell Science

TYLER, WILLIAM G., Ph.D. (Tufts University)
Associate Professor, Economics

TYNER, MACK, Ph.D. (University of Cincinnati)
Professor, Chemical Engineering

UDELL, BUDD A., D.Mus. (University of Cincinnati)
Associate Professor, Music

UELSMANN, JERRY N., M.F.A. (Indiana University)
Graduate Research Professor, Art

ULAM, STANISLAW M., Ph.D. (Polytechnic Institute In Lwow)
Graduate Research Professor, Mathematics

ULMER, GREGORY L., Ph.D. (Brown University)
Associate Professor, English

UMAN, MARTIN A., Ph.D. (Princeton University)
Professor, Electrical Engineering

URONE, PAUL, Ph.D. (Ohio State University)
Professor, Environmental Engineering Sciences

VALA, MARTIN T., Ph.D. (University of Chicago)
Professor, Chemistry

VALISALO, PAAVO E., Ph.D. (Technical University of Finland)
Associate Professor, Industrial and Systems Engineering

VAN BLOKLAND, PETER J., Ph.D. (University of Illinois)
Assistant Professor, Food and Resource Economics

VAN HORN, JR., HAROLD H., Ph.D. (Iowa State University)
Professor, Dairy Science

VAN RINSVELT, HENRI A., Ph.D. (University of Utrecht)
Professor, Physics

VAN VLIET, KAREL M., Ph.D. (Free University of Amsterdam)
Visiting Professor, Electrical Engineering

VANDERHILL, BURK, Ph.D. (University of Michigan)
Professor, Geography

VANDERIET, VERNON D., Ph.D. (Florida State University)
Associate Professor, Clinical Psychology

VANDERWERF, C. A., Ph.D. (Ohio State University)
Professor, Chemistry

VANDERZIEL, ALDERT, Ph.D. (University of Groningen)
Graduate Research Professor, Electrical Engineering

VANDIVER, JOSEPH S., Ph.D. (Louisiana State University)
Professor, Sociology

VANHARTESVELDT, CAROL, Ph.D. (University of Rochester)
Associate Professor, Psychology

VARMA, ARUN K., Ph.D. (University of Alberta)
Professor, Mathematics

VARNES, JILL T., Ed.D (University of Southern Mississippi)
Assistant Professor, Health Education and Safety

VARNES, PAUL R., Ed.D (University of Florida)
Professor, Professional Physical Education

VASIL, INDRA K., Ph.D. (University of Delhi)
Graduate Research Professor, Botany

VERA, HERNAN, Ph.D. (University of Kansas)
Assistant Professor, Sociology

VERINK, JR., ELLIS D., Ph.D. (Ohio State University)
Professor, Materials Science and Engineering

VERNON, JACK R., Ph.D. (Northwestern University)
Professor, Economics

VICK, KENNETH W., Ph.D. (Oklahoma State University)
Associate Professor, Entomology and Nematology

VICKERS, FRANK D., Ph.D. (University of Florida)
Associate Professor, Computer and Information Sciences

VIERCK, JR., CHARLES J., Ph.D. (University of Florida)
Professor, Neuroscience

VILALLONGA, FEDERICO A., Ph.D. (Buenos Aires University)
Professor, Pharmacy

VINCENT, JACK E., Ph.D. (University of Oregon)
Professor, Political Science

VLEK, PAUL L., Ph.D. (Colorado State University)
Adjunct Assistant Professor, Soil Science

VOGH, BETTY P., Ph.D. (University of Florida)
Associate Research Scientist, Pharmacology and Therapeutics

VOICHYSONK, BERNARD F., M.F.A. (Yale University)
Professor, Architecture

VOLIN, RAYMOND B., Ph.D. (Montana State University)
Associate Professor, Plant Pathology

VOLK, BOB G., Ph.D. (Michigan State University)
Associate Professor, Soil Science

VONMERING, OTTO, Ph.D. (Harvard University)
Professor, Anthropology

WACKERLY, DENNIS D., Ph.D. (Florida State University)
Associate Professor, Statistics

WADDILL, VAN H., Ph.D. (Clemson University)
Assistant Professor, Entomology and Nematology

WAGLEY, CHARLES, Ph.D. (Columbia University)
Graduate Research Professor, Anthropology

WAGLOW, I. F., Ph.D. (New York University)
Professor, Professional Physical Education

WAGNER, PATRICIA A., Ph.D. (University of Wisconsin)
Assistant Professor, Food Science and Human Nutrition

WAGNER, WILLIAM G., M.Arch. (Texas A & M University)
Professor, Architecture

WAHL, F. MICHAEL, Ph.D. (University of Illinois)
Professor, Geology

WAITES, ROBERT E., Ph.D. (Ohio State University)
Associate Professor, Entomology and Nematology

WAKEMAN, DONALD L., M.S. (University of Florida)
Professor, Animal Science

WALDBILLIG, ROBERT J., Ph.D. (University of Minnesota)
Assistant Professor, Psychology

WALDO, TOMMY R., Ph.D. (University of Florida)
Professor, English

WALKER, DON W., Ph.D. (Texas Christian University)
Associate Professor, Psychology

WALKER, JR., ROBERT D., M.S. (University of Florida)
Professor, Chemical Engineering

WALKER, THOMAS J., Ph.D. (Ohio State University)
Professor, Entomology and Nematology

WALL, GEORGE B., Ph.D. (University of North Carolina)
Assistant Professor, Food and Resource Economics

WALLACE, HAROLD D., Ph.D. (Cornell University)
Professor, Animal Science

WALLBRUNN, HENRY M., Ph.D. (University of Chicago)
Associate Professor, Zoology

WALSH, EDWARD K., Ph.D. (Brown University)
Professor, Engineering Sciences

WALSH, THOMAS, Ph.D. (University of Chicago)
Associate Professor, Mathematics

WANG, FLORA C., Ph.D. (Stanford University)
Affiliate Assistant Professor, Agricultural Engineering

WANG, YU H., Ph.D. (University of Southern California)
Associate Professor, Coastal and Oceanographic Engineering

WARD, DANIEL B., Ph.D. (Cornell University)
Professor, Botany

WARD, PHILLIP A., M.F.A. (Tulane University)
Professor, Art

WARD, RONALD W., Ph.D. (Iowa State University)
Professor, Food and Resource Economics

WARHEIT, GEORGE J., Ph.D. (Ohio State University)
Professor, Sociology

WARNICK, ALVIN C., Ph.D. (University of Wisconsin)
Professor, Animal Science

WARREN, MICHAEL E., Ph.D. (Massachusetts Institute of Technology)
Assistant Professor, Electrical Engineering

WASS, HANNELORE L., Ph.D. (University of Michigan)
Professor, Foundations of Education

WATSON, JAMES K., Ph.D. (Rice University)
Professor, Electrical Engineering

WATSON, ROBERT I., Ph.D. (Dana College)
Professor, Psychology

WATTENBARGER, JAMES L., Ed.D (University of Florida)
Professor, Educational Administration and Supervision

WATTLEWORTH, JOSEPH A., Ph.D. (Northwestern University)
Professor, Civil Engineering

WEBB, DANIEL W., Ph.D. (Kansas State University)
Associate Professor, Dairy Science

WEBB, RODMAN B., Ed.D (Rutgers State University)
Associate Professor, Foundations of Education

WEBB, SAWNEY D., Ph.D. (University of California at Berkeley)
Professor, Zoology

WEBB, WILSE B., Ph.D. (State University of Iowa)
Graduate Research Professor, Psychology

WEEMS, JR., HOWARD V., Ph.D. (Ohio State University)
Professor, Entomology and Nematology

WEHLBURG, ALBERT, Ed.D (University of Florida)
Associate Professor, Theatre

WEIDHAAS, DONALD E., Ph.D. (Cornell University)
Professor, Entomology and Nematology

WEINER, ROY S., M.D. (State University of New York)
Associate Professor, Immunology and Medical Microbiology

WEINGARTNER, DAVID P., Ph.D. (Michigan State University)
Associate Professor, Plant Pathology

WEISMANTEL, WILLIAM L., Ph.D. (Harvard University)
Professor, Architecture

WEISS, GERALD, (University of Michigan)
Professor, Anthropology

WELCH, PAULA D., Ed.D (University of North Carolina)
Associate Professor, Professional Physical Education

WELTNER, JR., WILLIAM, Ph.D. (University of California at Berkeley)
Professor, Chemistry

WENZEL, EVELYN L., Ed.D (Columbia University)
Professor, Instructional Leadership and Support

WEST, FRED E., Ph.D. (University of Iowa)
Visiting Assistant Professor, Health and Hospital Administration

WEST, GWENETH L., B.A. (Nebraska Wesley)
Assistant Professor, Theatre

WEST, ROGER L., Ph.D. (Texas A & M University)
Associate Professor, Animal Science

WEST, SHERLIE H., Ph.D. (University of Illinois)
Professor, Agronomy

WESTFALL, JR., MINTER J., Ph.D. (Cornell University)
Professor, Zoology

WESTIN, ROBERT H., Ph.D. (Pennsylvania State University)
Associate Professor, Art

WESTON, EDWARD G., Ph.D. (Florida State University)
Associate Professor, Journalism and Communications

WETHINGTON, JR., JOHN A., Ph.D. (Northwestern University)
Professor, Nuclear Engineering Sciences

WETTERQVIST, ORJAN F., M.S. (Royal Institute of Technology)
Associate Professor, Urban and Regional Planning

WHAN, ALEXANDER R., M.B.A (George Washington University)
Affiliate Assistant Professor, Health and Hospital Administration

WHEATON, THOMAS A., Ph.D. (University of California at Berkeley)
Professor, Horticultural Science

WHEELER, WILLIS, B., Ph.D. (Pennsylvania State University)
Professor, Food Science and Human Nutrition

WHIDDON, NANCY S., M.A. (Indiana University)
Associate Professor, Professional Physical Education

WHITCOMB, WILLARD H., Ph.D. (Cornell University)
Professor, Entomology and Nematology

WHITE, ARTHUR O., Ed.D. (University of Buffalo)
Associate Professor, Foundations of Education

WHITE, CALVIN E., Ph.D (University of Arkansas)
Assistant Professor, Animal Science

WHITE, ELLIS F., Ph.D. (New York University)
Professor, Educational Administration and Supervision

WHITE, FRANKLIN H., Ph.D. (University of Illinois)
Professor, Veterinary Medicine

WHITE, JAMES M., Ph.D. (Ohio State University)
Assistant Professor, Horticultural Science

WHITE, KEITH D., Ph.D. (Brown University)
Assistant Professor, Psychology

WHITE, NEIL L., Ph.D. (Harvard University)
Assistant Professor, Mathematics

WHITE, TONY, M.A. (Oklahoma State University)
Assistant Professor, Architecture

WHITNEY, ELLSWORTH D., Ph.D. (New York University)
Professor, Materials Science and Engineering

WHITNEY, JODIE D., Ph.D. (Oklahoma State University)
Professor, Agricultural Engineering

WHITTY, ELMO B., Ph.D. (University of North Carolina)
Professor, Agronomy

WHORTON, JAMES E., Ed.D. (Colorado State University)
Associate Professor, Special Education

WICKES, FRANK B., M.M. (University of Michigan)
Associate Professor, Music

WILCOX, CHARLES J., Ph.D. (Rutgers State University)
Professor, Dairy Science

WILCOX, MERRILL, Ph.D. (University of North Carolina)
Professor, Agronomy

WILDER, BUNA J., M.D. (Duke University)
Affiliate Professor VA, Neuroscience

WILDT, ALBERT R., M.B.A. (Purdue University)
Associate Professor, Marketing

WILENSKY, NORMAN M., Ph.D. (Yale University)
Associate Professor, History

WILFRET, GARY J., Ph.D. (University of Hawaii)
Associate Professor, Horticultural Science

WILHELM, HORST E., Ph.D. (University of Stuttgart)
Professor, Engineering Sciences

WILKERSON, SAMUEL J., Ph.D. (Tulane University)
Assistant Professor, Anthropology

WILKIE, WILLIAM L., Ph.D. (Stanford University)
Professor, Marketing

WILKINSON, JR., ROBERT C., Ph.D. (University of Wisconsin)
Professor, Entomology and Nematology

WILLIAM, RAYMOND D., Ph.D. (Purdue University)
Assistant Professor, Horticultural Science

WILLIAMS, AUBREY L., Ph.D. (Yale University)
Graduate Research Professor, English

WILLIAMS, CAROL A., B.A. (Connecticut College)
Associate Professor, Astronomy

WILLIAMS, CLYDE M., Ph.D. (Oxford University)
Professor, Radiology

WILLIAMS, DAVID D., Ph.D. (University of Florida)
Assistant Professor, Nursing

WILLIAMS, DAVID F., Ph.D. (University of Florida)
Assistant Professor, Entomology and Nematology

WILLIAMS, DONALD E., Ph.D. (Northwestern University)
Professor, Speech

WILLIAMS, EMMETT L., Ph.D. (George Peabody College)
Professor, Instructional Leadership and Support

WILLIAMS, HIRAM D., M.Ed (Pennsylvania State University)
Professor, Art

WILLIAMS, WILLIAM N., Ph.D. (University of Florida)
Associate Professor, Speech

WILLMORE, LUTHER J., M.D. (St. Louis University)
Affiliate Assistant Professor VA, Neuroscience

WILMOT, DAVID L., M.A. (Columbia University)
Professor, Music

WILSON, DAVID C., Ph.D. (Rutgers State University)
Associate Professor, Mathematics

WILSON, HAROLD A., Ph.D. (University of Iowa)
Associate Professor, History

WILSON, HENRY R., Ph.D. (University of Maryland)
Professor, Poultry Science

WILSON, JENNET M., M.A. (Columbia University)
Associate Professor, Nursing

WILSON, ROBERT E., Ph.D. (University of Pennsylvania)
Professor, Astronomy

WILTBANK, WILLIAM J., Ph.D. (University of Florida)
Professor, Horticultural Science

WINARSKY, IRA H., M.F.A. (Temple University)
Associate Professor, Architecture

WINEFORDNER, JAMES D., Ph.D. (University of Illinois)
Graduate Research Professor, Chemistry

WING, ELIZABETH S., Ph.D. (University of Florida)
Associate Professor, Anthropology

WING, JAMES M., Ph.D. (Iowa State University)
Professor, Dairy Science

WINIUS, GEORGE D., Ph.D. (Columbia University)
Associate Professor, History

WINKLER, ROBERT E., M.H.A. (Washington University)
Visiting Assistant Professor, Health and Hospital Administration

WINSBERG, NORTON D., Ph.D. (University of Florida)
Associate Professor, Geography

WISEMAN, BILLY R., Ph.D. (Kansas State University)
Associate Professor, Entomology and Nematology

WISLEY, PHILIP P., B.Arch. (Ball State Teachers College)
Assistant Professor, Architecture

WITTKOPF, EUGENE R., Ph.D. (Syracuse University)
Associate Professor, Political Science

WITTMER, PAUL J., Ph.D. (Indiana State University)
Professor, Counselor Education

WOESTE, JOHN T., Ph.D. (University of Wisconsin)
Professor, Agricultural and Extension Education

WOJCIK, DANIEL P., Ph.D. (University of Florida)
Assistant Professor, Entomology and Nematology

WOLFF, RONALD G., Ph.D. (University of California at Berkeley)
Associate Professor, Zoology

WOLKING, WILIAM D., Ph.D. (University of Minnesota)
Professor, Special Education

WOOD, CHARLES H., Ph.D. (University of Texas at Austin)
Assistant Professor, Sociology

WOOD, FRANK B., Ph.D. (Princeton University)
Professor, Astronomy

WOOD, JANICE A., Ph.D. (Florida State University)
Associate Professor, General Teacher Education

WOODARD, JAMES C., Ph.D. (Massachusetts Institute of Technology)
Professor, Pathology

WOODRUFF, ROBERT E., Ph.D. (University of Florida)
Associate Professor, Entomology and Nematology

WOODRUFF, WILLIAM, Ph.D. (University of Nottingham)
Graduate Research Professor, History

WOODS, CHARLES A., Ph.D. (University of Massachusetts)
Professor, Zoology

WORKMAN, RALPH B., Ph.D. (Oregon State University)
Associate Professor, Entomology and Nematology

WRIGHT, DAVID L., Ph.D. (Virginia Polytechnic Institute)
Assistant Professor, Agronomy

WRIGHT, JR., GERALD C., Ph.D. (University of North Carolina)
Assistant Professor, Political Science

WRIGHT, ROBERT G., Ph.D. (University of Kansas)
Associate Professor, Subject Specialization Teacher Education

WROE, MARTHA C., M.A. (Stanford University)
Associate Professor, Physical Therapy

WYATT, JOHN W., S.J.D. (George Washington University)
Professor, Management

WYNNE, JAMES W., M.D. (Cornell University)
Associate Professor, Medicine

YANG, MARK C., Ph.D. (University of Wisconsin)
Associate Professor, Statistics

YII, ROLAND, Ph.D. (University of Pennsylvania)
Research Scientist, Electrical Engineering

YOH, RICHARD W., Ph.D. (University of Buffalo)
Assistant Professor, Mathematics

YOUNG, DAVID G., Ph.D. (University of Florida)
Assistant Research Scientist, Entomology and Nematology

YOUNG, JERALD W., Ph.D. (Yale University)
Associate Professor, Management

YOUNG, MARTIN D., Sc.D. (Johns Hopkins University)
Professor, Immunology and Medical Microbiology

YOUNG, MICHAEL F., Ph.D. (Ohio University)
Assistant Professor, Interior Design

YOUNG, MICHAEL J., Ph.D. (Washington State University)
Associate Professor, Horticultural Science

YU, SHIH C., Ph.D. (Iowa State University)
Professor, Accounting

YUAN, TZU L., Ph.D. (Ohio State University)
Professor, Soil Science

ZACHARIAH, GERALD L., Ph.D. (Purdue University)
Professor, Agricultural Engineering

ZAHN, MARKUS, Sc.D (Massachusetts Institute of Technology)
Professor, Electrical Engineering

ZAM, STEPHEN G., Ph.D. (University of Southern California)
Associate Professor, Microbiology and Cell Science

ZARANTONELLO, SERGIO E., Ph.D. (University of Wisconsin)
Assistant Professor, Mathematics

ZAUNER, CHRISTIAN W., Ph.D. (Southern Illinois University)
Professor, Professional Physical Education

ZEMAN, JOSEPH J., Ph.D. (University of Chicago)
Professor, Philosophy

ZEPP, GLENN A., Ph.D. (Pennsylvania State University)
Associate Professor, Food and Resource Economics

ZETTLER, FRANCIS W., Ph.D. (Cornell University)
Professor, Plant Pathology

ZILLER, ROBERT C., Ph.D. (University of Michigan)
Professor, Psychology

ZIMPFER, WALTER H., M.S. (Rutgers State University)
Associate Professor, Civil Engineering

ZIPFEL, PETER H., (Catholic University of America)
Adjunct Professor, Engineering Sciences

ZOLTEK, JR., JOHN, Ph.D. (California Institute of Technology)
Associate Professor, Environmental Engineering Sciences

ZOLTEWICZ, JOHN A., Ph.D. (Princeton University)
Professor, Chemistry

ZORNETZER, STEVEN, Ph.D. (University of California at Irvine)
Associate Professor, Neuroscience.

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